The Aviation Historian®

The modern journal of classic aeroplanes and the history of flying

FINEST HOUR

A salute to Richard T. Riding

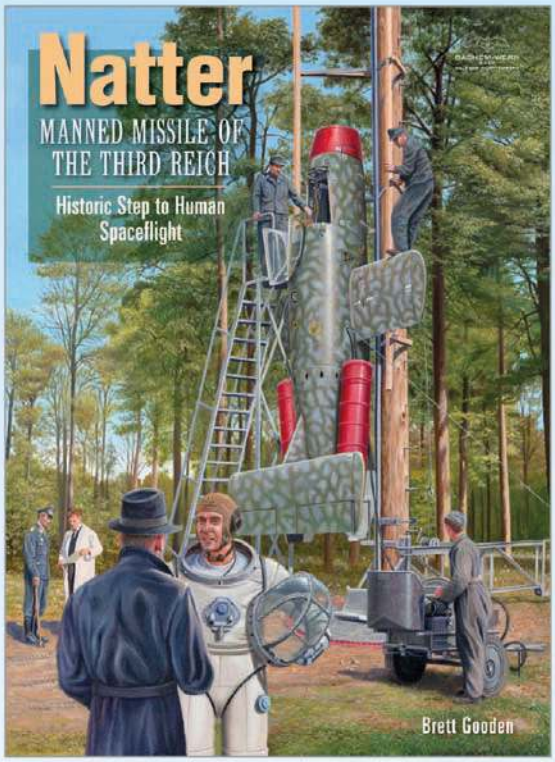
ISSUE 27



BOOK SIGNING

Join us for the launch of this monumental book on the remarkable manned rocket interceptor, the Bachem Ba 349 Natter.

The Aviation Bookshop - at the service of all aviation enthusiasts since the 1940s



NATTER: MANNED MISSLE OF THE THIRD REICH

Meet author, Lecturer in Space Medicine, Dr. Brett Gooden, who spent 25 years researching and writing this groundbreaking book, including undertaking multiple research trips to Germany in order to visit museums, archives and historic sites related to the history of this unique machine.

BOOK LAUNCH DETAILS:

The Aviation Bookshop marquee
Flying Legends Airshow, Duxford
Saturday 13 & Sunday 14 July

Hardback • c500pp • c870 illustrations

£60.00 PRE-ORDER YOUR COPY NOW

SPRING BOOK SALE

25% DISCOUNT OFF ALL NEW & SECONDHAND BOOKS AND MODEL KITS

Friday 26th – Monday 29th April 2019

Open hours 10am – 5pm everyday

Discount applies to shop sales, phone & web orders. Orders placed via the website will be automatically debited with 25% discount when we process the order.

The Aviation Bookshop, 31-33 Vale Road, Royal Tunbridge Wells, Kent, TN1 1BS, ENGLAND

01892 539284 (international: +44 18 92 53 92 84)

info@aviation-bookshop.com

www.aviation-bookshop.com

Payment Methods
Cheques made payable to The Aviation Bookshop

or you can pay via PayPal using info@aviation-bookshop.com

All major credit cards accepted

UK Postage & Packing
Postage to all UK addresses £5.00

Overseas Delivery Charges
Postal charges are made at cost price to The Aviation Bookshop.
We are unable to detail exact postal charges as orders are treated individually and the applicable charge is calculated accordingly.

NEW! Secondhand Booklist
Please contact us for our latest secondhand booklist.



Follow us on twitter for events, news and special offers @Avbookshop

Please quote **AVIATION HISTORIAN** when responding to this advert.

Information published here may be subject to change.

Published quarterly by:
The Aviation Historian
PO Box 962
Horsham RH12 9PP
United Kingdom

Subscribe at:
www.theaviationhistorian.com

ISSUE NUMBER 27
(published April 15, 2019)

EDITOR
Nick Stroud
e-mail nickstroud@theaviationhistorian.com

MANAGING EDITOR
Mick Oakey
e-mail mickoakey@theaviationhistorian.com

PRODUCTION MANAGER
Amanda Stroud

FINANCE MANAGER
Lynn Oakey

For all telephone enquiries:
tel +44 (0)7572 237737 (mobile number)

EDITORIAL BOARD
Gregory Alegi, Dr David Baker, Ian Bott, Robert Forsyth, Juanita Franzi, Dr Richard P. Hallion, Philip Jarrett HonCRAeS, Colin A. Owers, David H. Stringer, Julian Temple, Capt Dacre Watson

WEBMASTER
David Siddall Multimedia
www.davidsiddall.com

Published quarterly by *The Aviation Historian,*
PO Box 962, Horsham RH12 9PP, United Kingdom

© *The Aviation Historian* 2019
ISSN 2051-1930 (print)
ISSN 2051-7602 (digital)

While every care will be taken with material submitted to *The Aviation Historian,* no responsibility can be accepted for loss or damage. Opinions expressed in this magazine do not necessarily reflect those of the Editor. This periodical must not, without the written consent of the publishers first being given, be lent, sold, hired out or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of trade or annexed or as part of any publication or advertising literary or pictorial matter whatsoever.

recycle

If you do not wish to keep your copy of *The Aviation Historian* (impossible to imagine, we know), please ensure you recycle it using an appropriate facility.

MADE IN BRITAIN

Printed in the UK by
The Magazine Printing Company
using only paper from FSC/PEFC suppliers
www.magprint.co.uk

The Aviation Historian®
The modern journal of classic aeroplanes and the history of flying

Editor's Letter

IT WAS WITH profound shock and a deep sense of loss that we learned in January of the death of our erstwhile colleague, friend and "honorary grandfather" of *TAH,* Richard T. Riding. Back in 1973, "Arty Ar" was the founding Editor of pioneering UK aviation history magazine *Aeroplane Monthly*, where *TAH's* Managing Editor Mick learned his trade as Assistant Editor during 1983–98 before taking over the big chair from Richard on the latter's retirement, and where I was schooled in the RTR ethos of "passion and precision" during my rise through the ranks at *Aeroplane* through the 2000s.

Mick and I have always been proud to be able to trace our editorial ancestry from Richard's brilliant, mercurial piloting of *Aeroplane,* through Mick's stalwart stewardship of the same during 1998–2010, to our establishment of *TAH* in 2012; a venture of which Richard was immensely supportive, and to which he readily gave his seal of approval. We hope to live up to Richard's high standards and continue the work that he was so instrumental in establishing. Truly, no RTR, no *TAH*. Farewell, guv.

Nick Stroud

BELOW ***Four generations of British aviation Editors at Richard's home in August 2016. From left to right: Mike Ramsden*** **(Flight)*****; RTR*** **(Aeroplane)*****; Mick Oakey*** **(Aeroplane** ***and*** **TAH)*****; Nick Stroud*** **(TAH).**



FRONT COVER ***One of a series of magnificent colour photographs taken by Richard Riding at Bovingdon during the making of the film*** **Battle of Britain** ***in November 1968. See pages 50–53 for more . . .***

BACK COVER ***Pre-production Concorde F-WTSA is prepared for a test flight. Our look at the type's political genesis starts on page 10.***


FROM THE EARLIEST DAYS OF MANNED-FLIGHT, THROUGH TO THE PRESENT DAY AND BEYOND - XTENDED HAS GOT AVIATION COVERED.
LISTEN IN NOW, FOR FREE
HANDS UP - WHO'S DOWNLOADED XTENDED?
XTENDED
EUROPE'S PREMIER AEROSPACE INTERNET RADIO PROGRAMME
WWW.AVIATION-XTENDED.CO.UK


IF YOU CAN DREAM IT, WE CAN BUILD IT
ALLEGHENY
N111 2J
Our models are custom-made, personalized, of the highest quality and meticulous in every last detail to include markings and registration numbers. Your specifications will be our blueprint.
Our models are created in solid renewable mahogany, and are hand-painted to give a realistic and exact finish.
CUSTOM MODELS BY BRAVO DELTA
TAH
SPECIAL OFFER
get 10% discount — use code TAH2019 when ordering online at
www.custom-models.com
BRAVO DELTA MODELS
THE WORLD'S FINEST HAND CARVED MAHOGANY MODELS
Unit 5, Tollgate Court, Witheridge, Devon EX16 8TA
T: 01884 861011 E: aircraft@bravodeltamodels.com















CONTENTS Issue No 27

3 EDITOR'S LETTER

6 AIR CORRESPONDENCE

10 CONCORDE: INTERDEPENDENCE DAY
Professor Keith Hayward FRAeS celebrates the 50th anniversary of the first flight of the iconic supersonic airliner with an in-depth look at its early political history

20 SOUTH OF THE BORDER
In 1957 the Argentinian Navy ferried 11 Vought F4Us from the USA to their new home in South America. Santiago Rivas describes the Corsairs' epic intercontinental flight

30 FROM NILE EAGLE TO NASSER'S FOLLY
Designed by Willy Messerschmitt in Spain, powered by a British engine and test-flown by an Indian pilot in Egypt, the Hispano/Helwan HA-300 was a truly international affair, as João Paulo Moralez and Nick Stroud relate

42 RICHARD T. RIDING
Managing Editor Mick Oakey pays tribute to *TAH's* "honorary grandfather", aviation publishing pioneer and photographer Richard T. Riding, who died in January

50 *BATTLE OF BRITAIN* PHOTO GALLERY
In a further salute to Richard Riding, we present a stunning collection of colour and black-and-white photographs — most previously unpublished — taken by Richard during the filming of *Battle of Britain* in 1968

54 THE LONGEST HOP Part 1
Bob Livingstone introduces a two-part series on Qantas wartime Indian Ocean services with the early days of route-proving with overloaded Catalina flying-boats

62 MESSIEURS PAPIN ET ROUILLY'S ASTONISHING WHIRLING LEAF
French aviation historian Jean-Christophe Carbonel chronicles the efforts of two Frenchmen to develop a rotary-engined single-bladed "gyroptère" in the 1910s

74 BAD VIBRATIONS
Using contemporary documents, letters and drawings, Richard Seth-Smith investigates the causes of the Hawker Typhoon's mysterious early tail tribulations, which killed his test-pilot father Kenneth in 1942, and how they were cured

88 ROGUES' GALLERY
Renowned airline specialist Maurice Wickstead delves into the murky history of Bahamas World Airways, a nefarious national airline set up by some real pirates of the Caribbean

98 THE OLDEST SWINGER IN TOWN
Following the recent discovery by the Farnborough Air Sciences Trust of a set of 1949 drawings of a wildly ambitious supersonic variable-geometry fighter design, Tony Buttler takes a look at the work of Leslie Baynes

106 SMOOTH OPERATOR
Lennart Andersson details the development and career of the smooth-skinned Junkers K 47/A 48 fighter— a radical departure for the "crinkle-cut" company in the mid-1920s

120 ARMCHAIR AVIATION

125 LOST & FOUND

126 DON'T SPARE THE HORSES!
Former McAlpine Aviation staff pilot Ed Wild recalls being an aerial chauffeur for two famous British jockeys in the 1960s — one of which offered some very valuable tips . . .

130 OFF THE BEATEN TRACK

AIR CORRESPONDENCE



Letters to the Editor

A different angle on ailerons

SIR — Ever since early aviators started trying to master their inventions in actual flight, great creativity has been applied to variations of the aerofoil and its margins. A few such variations have lasted throughout aviation history, but many other ideas have come and gone. One of the briefest such existences must be the Mercier aileron mentioned in the fascinating story *Tragique—The Sud-Est SE.1010* in *TAH25*. Mercier was indeed an innovative engineer. In the late 1930s, in his Lioré et Olivier LeO 45, the inner wing used a twin-spar layout which accommodated bombs and fuel, while engine cooling was controlled by cowling rings moving fore and aft, eliminating the drag of the then virtually universal cowl flaps on air-cooled radial engines.

An internet search confirmed that I was not the only person ignorant of Mercier ailerons — I could find but one reference, the diagram appended. There are some clues in the accompanying article itself: "Apart from the full-span flaps thus allowed, British weekly *Flight* noted its Mercier ailerons", "the effectiveness of which was convincingly demonstrated by large roll-angles without visible trace of slewing or directional deviation". Aileron drag has plagued aircraft since hinged surfaces replaced wing-warping: the down-moving aileron moves into higher pressure than the up-going one on the opposite wing, the increased drag causing the



A PETIT LEXIQUE TECHNIQUE

AILERON ORDINAIRE

Ce genre d'aileron, le plus simple, consiste, en fait, en une portion du profil de l'aile rendue mobile sans aucun autre artifice. L'axe d'articulation est placé sur la ligne moyenne du profil. Un tel aileron est d'un rendement médiocre, difficile à équilibrer et à compenser.

Un autre type d'aileron ordinaire consiste à couper franchement le profil selon un plan, et de laisser à l'intrados l'espace nécessaire au débattement de la gouverne vers le bas, l'articulation étant constituée par une simple charnière ou un élément de charnière, placé le long de l'extrados.

Ces types d'ailerons sont encore, parfois, utilisés sur certains avions légers.

AILERON A FENTE

Le tracé de cet aileron est réalisé de telle sorte qu'en s'abaissant il ouvre une fente assure un écoulement nouveau qui souffle l'aile et lui assure un accroissement de portance qui en augmente l'efficacité. Au contraire, l'aileron qui se lève ferme la fente et son écoulement hypersustentateur.

Un tel aileron, ayant son axe d'articulation déporté vers l'arrière, est facile à équilibrer et à compenser.

AILERON FRISE

Un aileron Frise est tracé de telle sorte que lorsqu'il s'élève il crée une traînée supérieure à celle de l'aileron qui s'abaisse. De ce fait, le lacet inverse n'existe non seulement plus, mais un tel aileron crée un couple de lacet favorable au virage de l'avion. Certains chasseurs Hawker étaient équipés de ce tye d'aileron (Typhoon).

AILERON ZAP

Encore appelé aileron en « banc de jardin », cet aileron est déporté au-dessus du bord de fuite de l'aile, de façon à laisser toute l'envergure pour les volets d'atterrissage.

Un tel aileron fut monté sur l'avion Northrop « Gamma » de 1933

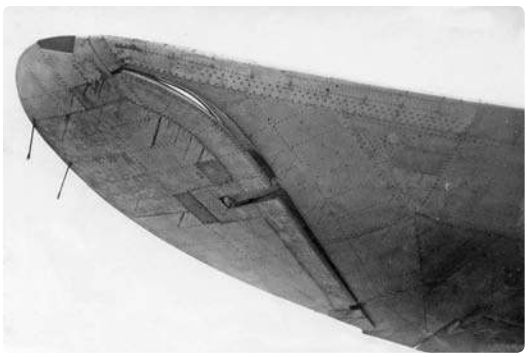
AILERON MERCIER

Monté sur le chasseur SE-100, cet aileron répond à la même préoccupation de l'aileron Zap, de laisser le maximum du bord de fuite aux volets d'atterrissage. Cependant, l'aileron fait toujours partie de l'aile, mais est rejeté à l'extrémité et intéresse la majeure partie du bord marginal.

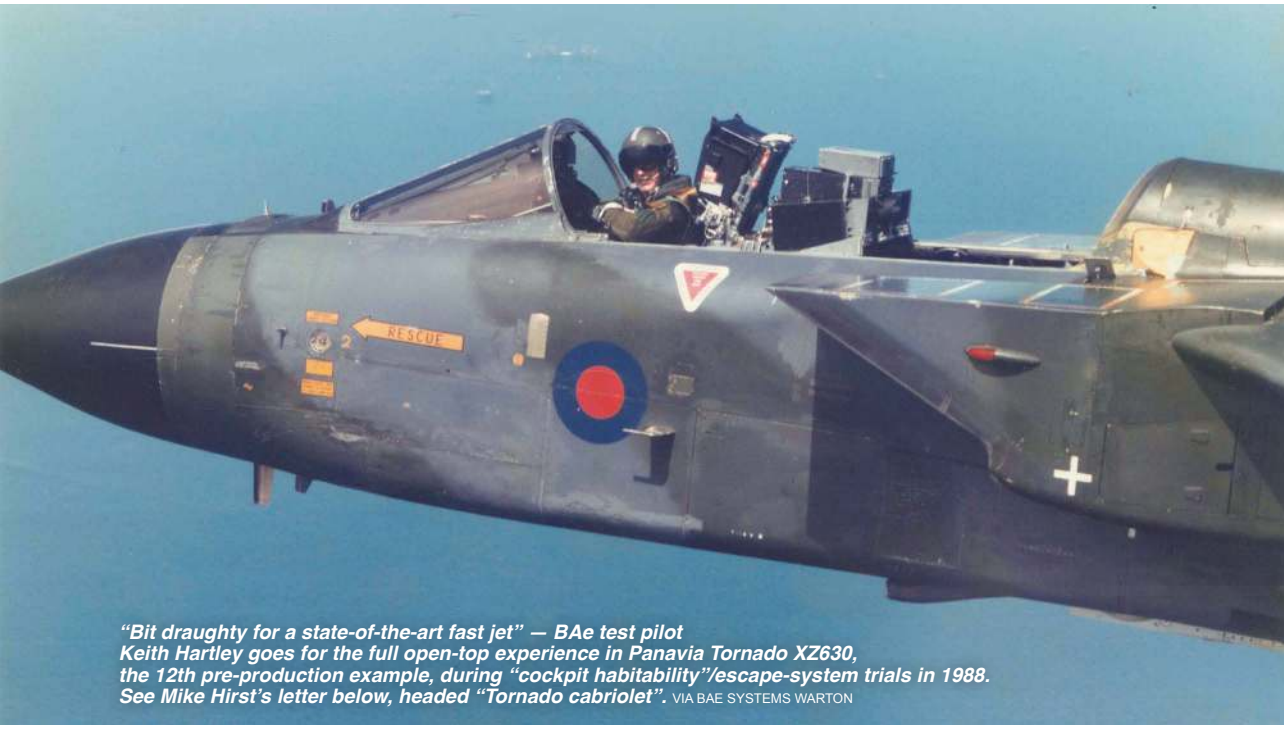


TAH ARCHIVE

Ailerons don't come stranger than Mercier — both in principle,* LEFT, *and in practice on the SNCASE SE.100 and the SE.1010,* ABOVE *and* BELOW *respectively. See Jon Pote's letter on these pages.



JOËL MESNARD



"Bit draughty for a state-of-the-art fast jet" — BAe test pilot Keith Hartley goes for the full open-top experience in Panavia Tornado XZ630, the 12th pre-production example, during "cockpit habitability"/escape-system trials in 1988. See Mike Hirst's letter below, headed "Tornado cabriolet". VIA BAE SYSTEMS WARTON

aircraft to yaw towards the raised wing — exactly the opposite of what is required. Differential ailerons (greater angular movement of the up-going surface) are the common answer, but nowadays designers have mastered the problem and many a modern aircraft has scant need of rudder pedals for turning, just for eliminating yaw in straight flight.

As shown in Joël Mesnard's detailed artwork, the Mercier aileron rotated around a shaft set at 45° to the chordline. This presented an equal drag-inducing area both above and below the axis of the wing, imparting a considerable roll force with little or no adverse drag. A theoretically brilliant concept, patented on June 9, 1942, it seems to have never been used again after the SE.1010. There must have been a proof- of-concept test airframe, perhaps only in a windtunnel, before the SE.1010 ***[the same manufacturer's SE.100 ground-attack fighter of 1939 was similarly equipped: see* Rum Punch *in* TAH13 *— Ed.]***, but nothing since.

I have always been very impressed how quickly the French aircraft industry recovered from the German occupation, having largely produced designs under licence rather than having an indigenous design capability during a period of rapid advance in technology. French manufacturers were cutting metal on their own designs by 1946 and produced an aircraft to match any propeller-driven aircraft in the USA or UK at the time. Sadly, the SE.1010 was one of several flawed designs of the era worldwide.

An article by an aerodynamics historian (is there such a beast?) on the multitude of ways designers have altered the edges and surfaces of wings for greater efficiency would be fascinating food for thought. Küchemann Carrots, anybody? ***[We touched on the latter in our Convair 990 article in* TAH23*, and in the* Air Correspondence *pages in* TAH25*; but a full dissection of the Carrots is something for a future issue — Ed.]***

Jonathan Pote *Auckland, New Zealand*

Tornado cabriolet

SIR — As a postscript to my article *The Tornado & Me* in *TAH26*, the accompanying picture of "P12" ***[XZ630, the 12th pre-production example, in which the author flew — Ed.]*** was sent from an old colleague at Warton. The caption was:

"Introducing the Cabriolet version! The last flight of P12 was used to explore if the pilot could safely fly the aircraft in the event of a canopy jettison. The 'volunteer' pilot was BAe test pilot Keith Hartley, who looks relaxed in this image with his arm resting on the cockpit."

Not sure this was the "last" of all flights, or the last flight before it was sent to Boscombe Down.

It could have returned to Warton for such tests.

Keith was an extrovert pilot: see https://www.youtube.com/watch?v=EUY0ut6gOxY.

I had some good times with him. Once, in Milan, we were shoehorned into a little Fiat (the original 500) when he picked me up from Linate airport and we took in the city, on the eve of the World Cup final . . . he drove through the crowded streets like a bat out of hell: some wonderful settings flashed by (I think).

Great days!

Mike Hirst *Loughborough, Leicestershire*

Those Pembroke protuberances

SIR — The cockpit-roof bulge on some Percival Pembrokes is definitely not for a later version of the Decca Navigator as your correspondent Vaughan Pomeroy surmised *(Air Correspondence, TAH20)*. I have tried to get a definitive answer about the purpose of the roof bulge from the people at St Athan where the Pembrokes are based. No response yet, but the nice people at Cosford where Pembroke WV746 is preserved (with cockpit bulge) on display did do some checking for me. Their answer, from assistant curator Claire Carr, is below.

"On examination of the aircraft, our Curator discovered that the ADF unit fitted to the pilot's overhead console extended into the space left by the bulge, and with the array of navigation equipment fitted came to the conclusion that the particular aircraft which required a navigation fit for flying airways required the extra space offered by the bulge. As you can see from the attached image, the kit included ADF, DME and two ILS/VOR units (one missing on ours).

"According to the pilot's notes on the aircraft the Decca navigation kit is not located in the area of the bulge.

"Interestingly, if you look at photographs of WV740 G-BNPH flying today you will see that there is an aerial fitted into the top of the bulge! There is no reference in the RAF pilot's notes to an aerial in that location and there is a diagram of their locations in the notes so we conclude it must be for 'modern day' kit."

(That small aerial on top of the bulge on WV740/G-BNPH is for the GPS.)

Tom Singfield *Horsham, West Sussex*

Bitten on the bum

SIR — Excellent magazine. Just what I like, at last. A minor nitpick for *Snakes in the Snow,* page 127 of *TAH23:* the engine shown in the Hurricane snow blower is probably *not* a Viper. Looks more like an Orpheus to me, too big to be a Viper. The engine on page 129 *is* a Viper; notice the small size.

Fantastic magazine, keep up the little nitpicks for us OCDers to rant over.

Peter Butt *via e-mail*

[Many thanks for your e-mail, and for your encouraging words about* TAH *— very much appreciated! Regarding the Hurricane snowblower, you could well be right, it does look rather larger than a Viper — maybe it's one of the older J57s the Vipers replaced. Info on the pics available was somewhat scant! Hopefully







Percival Pembroke roof-bumps decoded at last — see Tom Singfield's letter on this page. Tom sent the two photographs* ABOVE LEFT *and* ABOVE RIGHT *of N46EA at the Gatwick Aviation Museum at Charlwood on the West Sussex/Surrey border, while RAF Museum Cosford assistant curator Claire Carr provided the image* ABOVE MIDDLE *from the cockpit of the museum's example, WV746, showing its ADF, DME and ILS/VOR kit.





Two views of the LIPNUR SU-200 Sikumbang preserved in the Indonesian Air Force Museum at Yogyakarta — see Marc Koelich's letter on this page.

somebody amongst our readership will pop out of the woodwork with a definitive answer. Thanks again — if you don't mind, I'll continue to try and keep the scope for nitpicking down to a minimum! Nice to see readers are paying attention, however . . . Ed.]

Indonesian aircraft preservation

SIR — My friend Albert Grandolini has brought to my attention your very informative and well documented article *Indonesia's Fledgling Insects* in *TAH21*, on the early aircraft produced by Indonesia under the supervision of Nurtanio.

The NU-200 prototype had been preserved at the IPTN/PT DI premises at Bandung, but was recently dismantled and moved to the Indonesian Air Force (TNI-AU) Museum at Yogyakarta.

TNI-AU had quite a few aircraft preserved as monuments inside air bases or public parks. Many of them were slowly decaying while others were displayed in most fanciful liveries.

During the past few years, a serious restoration effort has been undertaken at the instigation of TNI-AU Chief of Staff Air Marshal Hadi Tjahjanto, who has now been promoted to Chief of Armed Forces.

I have included some photographs of the NU-200 at Yogyakarta in December 2017.

Marc Koelich *via e-mail*

Pictures wanted . . .

Canada-based* TAH *subscriber Chris Bryant is seeking good clear photographs of RAF Douglas Dakota FL510* Sister Ann, *as it appeared on South East Asia Command duties during and after World War Two. Images can be e-mailed, and due credit will be attributed. Please contact Chris direct on cbryant@ripnet.com.



Concorde

INTERDEPENDENCE DAY

The political perspective

50 years ago, on March 2, 1969, the iconic Anglo-French Concorde first flew. The political road to this aeronautical milestone — representing the opening of a new era in international collaboration for the British aerospace industry — was far from smooth, however, having taken a long, hard decade to traverse, as **Prof KEITH HAYWARD FRAeS** explains

IT IS NOW commonplace to describe the UK as being at the heart of a European aerospace industry, certainly since the 1965 Plowden Report, which stated categorically that "Britain is unlikely to be justified again in embarking alone on an expensive new [aeronautical] project". This was a hard truth to accept, but by the end of the 1950s the rising costs of both civil and military aircraft were increasingly difficult to support by means of the British market alone.

International collaboration was a solution to this — but with whom? The USA was too big and unwilling to concede much to the UK technologically speaking. Germany, Italy and Holland were either too weak or too small to be considered desirable partners. This left France, still rebuilding its industry after the war, but with a growing confidence backed by a run of successful civil and military aircraft designs.

Working with the French emerged as the "least-worst" alternative, and by 1964 the UK and France were working together on an ambitious supersonic airliner, a series of joint military programmes and a European organisation developing a civilian satellite-launch vehicle. Of these, the supersonic transport (SST) project was the linchpin of collaboration; the one programme large enough and expensive enough to force proudly independent national companies to combine in their mutual interest. Never free of political interests and controversy, the Concorde had a highly political birth.

A FALSE START

British work on SST concepts had begun in 1954 with the establishment of the Supersonic Transport Aircraft Committee (STAC). By 1959 preliminary work had established the basic outline of a Mach 2·2-capable aluminium-alloy airframe design. All involved felt that this was the obvious direction for air travel to take, and presented an opportunity for the UK to regain its position in the civil aircraft market. It was also clearly too expensive to be undertaken by industry alone and would have to be given government support.

To move things along, Bristol was awarded a design study contract based on its Type 198 supersonic transport. Costs of full development were estimated to be £60m–£100m, about twice those of the Vickers VC10 airliner.[1] The Minister of Supply, Aubrey Jones, was rather more pessimistic about the cost estimates and came to the conclusion that international collaboration would be necessary. But the crucial question remained — with whom?

Ministry of Supply (MoS) officials felt that working with the USA would reduce competition, even if at first sight it seemed "absurd" to work with "our obvious rivals". The Ministry clearly felt that there were no "rivals" across the Channel, and working with a European partner would "lead to difficulties and delays". However, failing the American option, Europe was "well worth investigating" and as an option, a political approach might be justified.[2]

In the event, France took the initiative. In July 1959 the French wrote to Jones suggesting a meeting of officials and technicians to discuss collaborating on an SST. They too had been investigating such a project, albeit along the lines of a "Supersonic Caravelle", focusing entirely on medium-range services to avoid direct competition with any American design. Jones replied positively, but felt that progress would be best achieved through a commercial association between firms.

The proposal received a lukewarm response in London; "laughed to scorn" in Jones's words. The UK felt that the French had little to offer technologically and were seeking to fill a major gap in their civil aero-engine capabilities. The Cabinet rejected the French offer.[3]

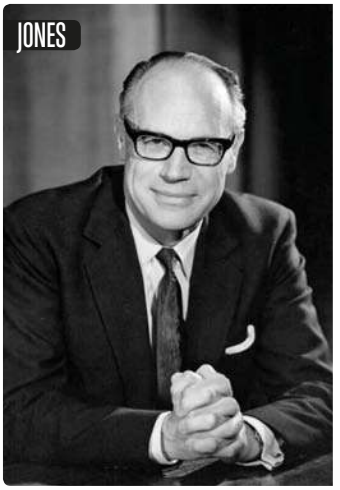
NEW GOVERNMENT, NEW POLICIES

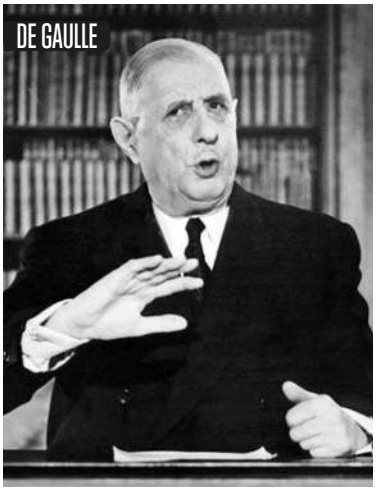
Within a year a major shift in policy was evident. The general election of 1959 brought a new sense of direct engagement in the aircraft industry and a determination to press ahead with the SST. Crucially, Harold Macmillan's government also decided to apply for membership of the European Economic Community (EEC) and as the French President, Charles de Gaulle, might be something of a barrier to entry, working with the French on an SST achieved a wider political objective.

Soon after the election Duncan Sandys, in the newly minted position of Minister of Aviation, met his French opposite number to discuss collaboration generally, and exchanged information on SST progress. It was evident that the UK was further ahead than France, and wanted a clear focus on a long-range aircraft. The British also made it clear that they expected prospective manufacturers to contribute to the cost of development and that any agreement must include some form of cost-recovery for government contributions. The meeting closed with a tentative collaborative formula.[4]

In April 1960 the ministers met again. Sandys stated that the UK was not committed and was mindful of the risk of being first into the field and "losing a lot of money", but he was also aware of its importance to the future of the industry. He also made it clear that the UK was still looking across the Atlantic. Both sides agreed to keep in contact pending more substantive developments.[5]

In the UK the internal debate picked up speed.







A July 1960 Cabinet meeting considered the project. Again, costs dominated thinking. These were put at £100m for a Mach 2·2 aircraft. There was pressure to move on to a feasibility study, but Treasury ministers were worried that this would lead irresistibly to a commitment to full development. Delay, however, could weaken Britain's bargaining position in any collaborative enterprise. According to the notes from the July 1960 Cabinet meeting:

"Unless British firms [undertake] these studies, it would be impossible for us to explore the possibility of a joint project with American and perhaps French firms. We [can]not afford to proceed with the development and production, as a solely British venture, of an extremely expensive aircraft for which the total world market would be very restricted."

It was agreed that the UK should move forward and develop a more detailed feasibility study to provide "a competitive basis for negotiations with a view to co-operation with the United States or continental countries on whatever project might eventually be agreed".[6]

THE COMMON MARKET ISSUE

In July 1961 the British government announced its formal application to join the EEC. With de Gaulle known to be suspicious of British motives for various reasons, including concerns about the UK's "junior partner" relationship with the USA since Suez in 1956, and already inclined towards a veto, a prestigious Anglo-French programme would support the UK's application. Formal negotiations with the French on an SST project began shortly after. However, this overt political linkage between the EEC application and an SST rang alarm bells in the Treasury:

"There is a clear danger that HMG [Her Majesty's Government] will be confronted with an Anglo-French project commanding the enthusiastic support of both industries and both ministries. It will undoubtedly be represented as a striking example of European or Common Market co-operation, and may be a great deal harder to resist than any purely British programme."[7]

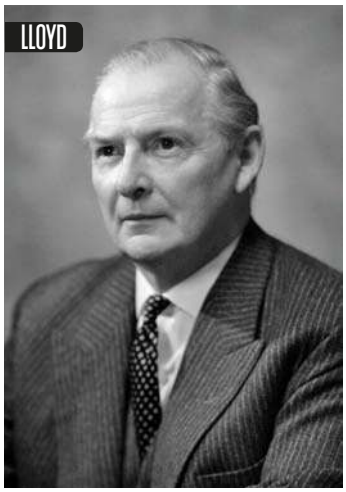
On the other hand, the Ministry of Aviation (MoA) team, under Peter Thorneycroft since July 1960, felt that the Treasury was undermining the MoA's negotiating position, especially as the British side already felt at a disadvantage, as the French had sufficient financial authority to launch an SST — independently if necessary:

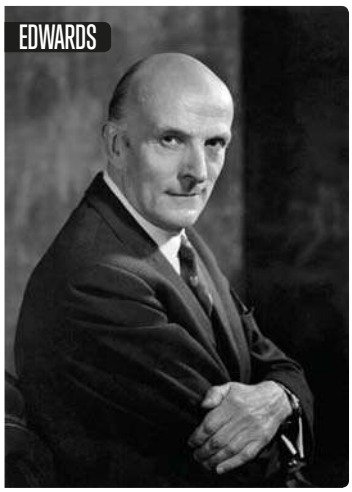
"There is a serious danger that unless we are able to agree something of this kind, the negotiations with the French will break down, and that we shall lose the opportunity of sharing the cost of a supersonic airliner project with them."[8]

Co-operation with the USA was now also ruled out — "investigations into the possibility of collaboration with the USA have been fruitless".[9] Further official and industry-level talks with France were deemed "more promising", although a fundamental difference of opinion remained over the prospective aircraft's range. The British believed that a long-range aircraft was the only option that made commercial sense, whereas the French still wanted to avoid direct competition with an American SST. However, collaboration could still work with two versions sharing key features, including the powerplant. The aircraft could be in service by 1970, which should offer a five-year monopoly in the market.[10] Significantly, both sides noted that the effects of the sonic boom might be "a big problem" and that "there would not be much of a market for an aircraft able to operate only over the sea".[11]

The French wanted to move forward quickly towards a substantive agreement but the British felt that there were "some dangers which must be avoided in negotiation". In particular, the UK wanted to avoid splitting design leadership by airframe and powerplant, and by long- and medium-range versions. The French government was also unlikely to seek to recover the public contribution to costs from Sud and, as stated in







MoA notes in September 1961, "we will have to deal with this difference to avoid prejudicing the UK industry position". More importantly, "we must also avoid giving up our bargaining position by implying that we will not go ahead on our own if we fail to agree with the French".[12]

These issues shaped the British position before a crucial series of meetings in the autumn of 1961. The MoA team felt that it had the upper hand technologically and France feared competition from the UK if talks broke down. However, British powerplant superiority could be leveraged to avoid penalising the British Aircraft Corporation (BAC), established with the merger of Bristol, English Electric, Vickers and Hunting in 1960. Under Treasury pressure, British officials still wanted a degree of cost recovery.[13]

At an October 1961 meeting Thorneycroft and French Transport Minister Robert Buron agreed in principle to a 50/50 share of the programme overall, and produced an outline of a collaborative organisation, specifying two versions of the prospective SST and twin assembly lines. There was, however, no agreement over cost recovery or "airframe leadership". The French readily conceded the powerplant lead to the UK but were holding out for leadership on the airframe as a means of compensation. Senior MoA official Denis Haviland suggested a joint company, which would give both sides "equal standing in world prestige". However, on cost recovery, the French attached "little importance . . . to the system employed in the UK — but matters could be arranged on a comparable basis if necessary".[14]

THE QUESTION OF LEADERSHIP

Cost recovery certainly exercised the Treasury. In October 1961 the Chancellor, Selwyn Lloyd, wrote to Thorneycroft:

"There is a fairly serious disagreement of principle between us on the general question of aid to the aircraft industry, especially as I fear that this disagreement may have to come to a head on the particular case of the supersonic airliner. Since 1960 [and the introduction of repayable "launch aid"] any new project has to promise an economic return, and it may well be that the issue will be expressed most clearly in connection with the SST, where the evidence which I have seen so far seems [to suggest] that the prospects of an economic return are, to put it at the lowest, extremely unpromising. I am sure you have left M Buron with no doubt that HMG has not made a decision on this project, and that any plans for an Anglo-French project must be completely provisional at this stage."[15]

Thorneycroft was not to be put off. The same month he told the Cabinet that the SST was vital to the future of the UK civil aerospace industry:

"Whether we like it or not, the 1970s will almost certainly see the introduction of supersonic air travel . . . the Americans are thinking in terms of an all-steel aircraft capable of Mach 3, but this is an extremely ambitious project . . . a great deal of preliminary work has been done in this country on a possible design for a Mach 2 aircraft built in light alloy, and my technical advisers firmly believe that Britain has an opportunity here of gaining the leadership we so narrowly missed with the [de Havilland] Comet. They are confident that the Mach 2 aircraft could not only be first in the field if a resolute start were made now, but would prove more economic than an all-steel aircraft, particularly on medium-range routes. It would be wrong to leave this class of aircraft entirely to the United States and Russia."[16]

Collaboration was the only route to this destination. The question of programme leadership, however, seemed an intractable one. Sir George Edwards, Executive Director of BAC, was adamant that the French should not be allowed to claim priority on the airframe. He asserted that a divided leadership was unacceptable:

"By tradition and practice the controller of airframe development and production drives the whole project. Leadership on the engine cannot



MIKE STROUD

ABOVE ***Sud Aviation had begun working on* "Transport Civil Supersonique"** ***projects in 1958, and by 1961 was able to display a model of its Super Caravelle concept at the Paris Air Salon that May. Few details were provided, but Sud described the model as "representative of the layout which current research is intensively exploring".***

counterbalance the influence of leadership on the airframe. Given Britain's past work on the SST concept, overall design responsibilities must be shared equally."

Denis Haviland concurred, stating that it must be made clear to the French that "this sort of subordinate position was unacceptable — a first and last negotiating position."[17]

In February 1962 Edwards was still being exercised by French demands that left BAC in a "wholly subservient role". If this approach was adopted, "the task of looking after British interests would be a continuous and intolerable burden. The British taxpayer will in effect be subsidising French dominance in European aviation". The following month he again asserted, "it seems necessary that we must make it clear that unless appropriate control of British interests can be established in the next six months, then we have no option but to withdraw".[18]

The MoA was also conscious that the UK was losing an important public-relations battle; it was imperative to counter the impression that "we are being dragged along by the French" and assert that the UK was not the junior partner in a "Super Caravelle".[19] The MoA was nevertheless increasingly committed, if not fully funded. The SST was a key manufacturing issue, and collaboration with France was the only realistic option. The Treasury, however, wanted to avoid a premature decision, even in principle. In its view, both sides "have a strong interest in going ahead". Furthermore, there was "a danger that the press here and in France will create an atmosphere in which the public will assume that HMG [has] taken the plunge".[20]

The Anglo-French ministerial meeting of March 23, 1962, was decisive. The French agreed to a modified industrial organisation that divided technical and managerial direction equally between the two companies. Work on two versions of the aircraft would be divided roughly equally between the two countries, controlled by a joint committee structure with equal representation. The presidency, which would incorporate a casting vote, was to be held alternately by the two nations. On this basis Britain would be responsible for some 70 per cent of powerplant development work and about 40 per cent of airframe development. Both nations agreed to advance £1m for detailed research work, but this would not constitute agreement to launch the project; that decision would be made by the British Cabinet in the autumn.[21] The scene was now set for a final struggle at the top of the British government.

TAKING THE PLUNGE

The SST question thus came to a head in the UK in the autumn of 1962. The Anglo-French governmental and industrial teams had spent much of the year successfully hammering out the details of technical, organisational and market issues. But the MoA and Treasury were at odds over the economic value of the programme. In order to obtain a neutral view, Macmillan handed the matter over to the Committee on Civil Scientific Research & Development (CCSR&D) chaired by R.A. "Rab" Butler, the First Secretary of State (*de facto* Deputy Prime Minister), to investigate the question.

The CCSR&D was remitted to consider the



BAE SYSTEMS WCN 2751

ABOVE ***Representing an industrial project of considerable international prestige, there was certainly no shortage of Concorde display models, and this magnificent mid-1960s example in gleaming chrome is seen at a British show accompanied by offspring in the colours of the various airlines that had placed options for the new airliner.***

merits of the SST, along with other areas of potential R&D investment. It accepted that the SST was "a natural manifestation of technological progress" in air travel. All pre-production work would have to be financed by public funds in both countries, estimated at £150m, with a margin of error of at least £20m either way, although an increase was thought more likely than a reduction. While industry was willing to commit "a large part of [its] resources to it for many years", the SST would be an exceptional case, owing to the degree of risk involved, and the industry "cannot stand on normal expectations of an economic return". The UK government would, however, seek to recover at least part of its expenditure by participating in the proceeds of sales. The British national flag-carrier, BOAC, would be expected to order "up to six pre-production types but, because of its recent heavy financial losses, cannot afford to do this unless the government agrees to underwrite the risk until such time as a commercial judgment can be made".[22]

The Committee saw some risks in aiming for Mach 2 when the USA was looking to develop a Mach 3-capable airliner; but, if the aircraft was to be launched, collaboration with the French was the only way to go. As the notes from meetings with the French in March 1962 and Butler's memoranda from November 1962 state:

"In company with the French we could get in first, with the assurance of at least a substantial part of the European airliner market; if the project was both technically and commercially successful and completed on time a very substantial volume of export business would be obtained, and our aircraft industry would be assured of a place in the front rank of the world's suppliers of large civil aircraft, at least some way into the 1970s.

"In the competition for civil air-passenger traffic, some of our airlines at least could enjoy for a time some advantage from pioneering a very much faster aircraft; and we might expect on past experience to reap [benefits] from the project's advances in technology, which could help industries besides the aircraft industry. The venture would [also] be an outstanding example of interdependence, and would help to promote the integration of the aircraft industries of Western Europe."[23]

Unknowns such as the sonic-boom issue and the radiation effects of high-altitude operation would have to be investigated, as there was some risk that these might impair full operational flexibility, and resources might be drained from other sectors. The notes go on to reject thoughts that resources directed at the supersonic airliner might be better spent on other sectors, "as failure to accept the challenge [of civil supersonic flight] could well mean contracting out of the large passenger aircraft business."[24]

CRUNCH TIME

The CCSR&D's analysis, and further submissions from the MoA, formed the basis for the Cabinet's formal decision on November 6, 1962, to proceed. To the MoA, the alternatives were stark: on one hand the industrial team would "command resources as large as any single United States combine" and there would be "political advantage in a large project carried out in co-operation with the French". If, on the other hand, the proposal was rejected, "the Bristol [-based] design team



This late-1960s artist's impression of a BOAC Concorde confidently streaking through the upper atmosphere leaping continents at supersonic speed was in contrast to the British flag-carrier's own concerns about the aircraft at the time; namely that it might prove difficult to operate profitably — a concern that proved to be prescient, at least initially.

TAH ARCHIVE



LEFT ***A contemporary display model of Concorde in the colours of United Airlines, one of six American carriers to place an option for the aircraft, the others being Pan American, American Airlines, Braniff, Continental Airlines and TWA — none ended up operating the type.*** BAE SYSTEMS WCN 1967

BELOW ***The first Concorde prototype, 001, registered F-WTSS (for*** **Transport SuperSonique*****) is rolled out of the Sud Aviation factory at Toulouse on December 11, 1967, to be inspected by 1,000 guests — and the world's press. This aircraft made the iconic airliner's first flight at the same venue on March 2, 1969.***



TAH ARCHIVE



BAE SYSTEMS

ABOVE ***Geoffroy Chodron de Courcel, French Ambassador to the UK (left), and Julian Amery, the UK's Minister of Aviation during 1962–64, get to grips with a model of Concorde at the signing of the Anglo-French Agreement — actually an international treaty comprising a mere seven articles — at Lancaster House on November 29, 1962.***

would have to be disbanded; there would be less work which could be subcontracted to Shorts in Belfast and other concerns; and the UK would go out of the manufacture of large long-range aircraft for passengers or freight. To contract out in this way would be difficult to reconcile with the government's declared policy of supporting the civil aircraft industry".

Concerns about the sonic boom and radiation issues were brushed aside: "These considerations did not amount to arguments against the project. Rather, they would result in certain limitations on the operation of the aircraft, the effect of which would be felt in the economics of using it".[25]

The Treasury remained sceptical. The Chief Secretary to the Treasury, John Boyd-Carpenter, agreed that "supersonic travel would come sooner or later". But he hesitated to "commend the particular proposal before the Cabinet because of its poor showing in commercial and financial terms". He was particularly concerned that neither the manufacturers nor BOAC were prepared to put money of their own into the project. There were attractions in a joint enterprise with French industry, but it would consequently be "the more difficult to stop if it appeared to be losing its promise".[26]

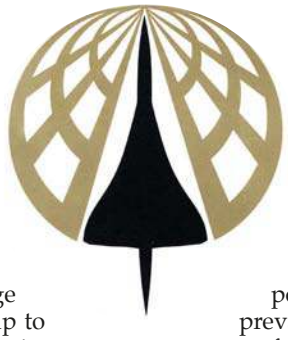
Summing up, the Prime Minister said that it was peculiarly difficult to judge this proposal on technical and economic grounds, but that "there was advantage in a project which would demonstrate dramatically interdependence between the UK and France at this stage; and there might be advantage from such a link between the UK and Europe in the wider field of relations between the major powers". It would be important, he continued, to ensure that if the project was to go ahead then it should do so on a basis which involved some financial contribution from the companies and ensured that they participated with the maximum efficiency, and that the aircraft was known by a name which would reflect the joint participation of the UK and France.[27]

TO "E" OR NOT TO "E" . . .

The Cabinet thus authorised the Minister of Aviation, by then Julian Amery, to undertake the following: "Inform the French government that the proposal for the joint development of an Anglo-French supersonic airliner [is], in principle, acceptable to the UK government, subject to satisfactory assurances on the participation of French airlines, and to final examination of market prospects . . . [we] invite the Minister of Aviation to discuss with the French authorities the drafting of formal Heads of Agreement between the two governments on the development and financing of the airliner and, in particular, to propose a name for it which would reflect joint participation in the project".[28]

Amery duly reported back to the Cabinet on his meeting with the French. Two versions would be built and the French agreed that the aircraft would not be given the name "Super Caravelle", but rather an apposite word that meant the same — agreement — in both languages; Concord in English and *Concorde* in French. It was still a name that would cause a certain amount of trouble further down the road, regarding whether or not to adopt the French "e" for all aircraft.[29]

The Anglo-French Agreement launching the BAC/Sud Concord(e) SST was duly signed on



November 29, 1962. The formal agreement was a mere two pages in length, with many of the details of programme management still to be resolved. The parties agreed to the construction of two common prototypes, with production to be based on two versions, one long-range and one medium-range. Total costs up to 1969 were put at £135·2m. Significantly, it was an international treaty, not a commercial agreement between companies, and did not contain a break clause — a situation which was to have serious repercussions later.[30]

The Treasury was far from happy with the outcome. Officials felt the Minister of Aviation had made a number of tendentious statements, being too dogmatic about costs than "available evidence warrants". A Treasury official, reacting to a draft of Amery's November 29 statement, noted that the Minister wanted to make "remarks to the effect that it is on our ability to apply and exploit scientific advances of this kind that an economic and industrial position in the world will largely depend. It seems to us just as arguable that this will pour out taxpayers' money on a dubious venture of this kind in precisely the wrong way to proceed if we want to get a healthy economy".[31]

Industrial and, perhaps more important, foreign-policy interests had prevailed. As Julian Amery stated at the press conference announcing the agreement:

"Even more significant may be the lessons which France and Britain will learn from working together on every aspect of a joint project of this size. Our two countries were pioneers in the early days of aircraft production. Then they were also rivals. But now the time has come to join forces if we are to hold a leading position in the air routes of the world."[32]

Hopes that the new supersonic airliner project would seal Britain's bid to join the EEC were soon dashed, however, with de Gaulle's veto of the UK's application in January 1963. Nevertheless, the future of Britain's aerospace industry as a collaborative player was set.

1 STAC report, recommendations and official notes, UK National Archives (TNA) ref AVIA 63/30; for details of the early work on the SST, see Owen, K., *New Shape in the Sky* (Jane's, 1982) and Knight, G., *Concorde: The Inside Story* (Littlehampton Book Services, 1976)
2 Meeting with Minister of Supply (Jones), April 29, 1959, TNA ref AVIA 63/30
3 Letter from French Air Ministry to Aubrey Jones and reply: July 10 and August 6, 1959, TNA ref AVIA 63/20 and interview with the author
4 Note of meeting between UK and French officials, October 27–28, 1959, TNA ref AVIA 63/16
5 Meeting between Sandys, UK officials and French team to discuss general collaboration, April 12, 1960, TNA ref AVIA 63/16
6 TNA ref CAB/128/34, July 20–21, 1960
7 Treasury memoranda, July 31, 1961, TNA ref T225/1743
8 MoA exchanges before meeting between Thorneycroft and Buron, March 8, 1961, TNA ref SUPP 2967
9 Gardner, R., *From Bouncing Bombs to Concorde: The Authorised Biography of Sir George Edwards* (Sutton, 2006) p193
10 MoA note on SST, July 13, 1961, TNA ref AVIA 63/16; also Owen, op cit, pp44-45
11 MoA notes, September 20 and 25, 1961, TNA ref AVIA 63/155; Royal Aircraft Establishment report and minutes of Anglo-French meeting, September 20, 1961, TNA ref SUPP 29/67
12 MoA notes September 20 and 25, 1961, ibid
13 Ministerial brief in advance of meeting with Buron, October 2, 1961, TNA ref AVIA 63/155
14 Note of meeting between British and French officials, October 2, 1961, ibid
15 Note from Chancellor of the Exchequer to Minister of Aviation, October 2, 1961, ibid
16 "The Future of the Aircraft Industry"; memo by the Minister of Aviation, TNA ref CAB 129/106/50, October 6, 1961
17 Minutes of official meeting in Paris, December 1,1961; MoA note December 15, 1961; meeting between MoA and Sir George Edwards and Sir Arnold Hall, December 5, 1961; note from Civil Air Attaché Paris, December 5, 1961; meeting between MoA officials and Sir George Edwards, December 14, 1961; Gardner, op cit, p194
18 Notes from Sir George Edwards, February 22 and March 12, 1962, TNA ref SUPP 2967
19 Minutes of meeting with Minister of Aviation (Thorneycroft), March 2, 1962, ibid
20 MoA notes before March 8, 1962, meeting with Buron; Treasury note, March 2, 1962, ibid
21 Minutes of Anglo-French ministerial meeting, March 23, 1962, ibid; memoranda from First Secretary of State (Butler), November 3, 1962, TNA ref CAB/129/111
22 ibid
23 ibid
24 ibid
25 November 6, 1962, TNA ref CAB/128/36
26 ibid
27 Ibid
28 Ibid
29 November 20, 1962, TNA ref CAB/128/36
30 By the end of 1963, following a Pan Am commitment to the long-range version and little sign of interest in a medium-range aircraft, the French finally accepted the long-established British position to focus on a single long-haul airliner. Much has been made of the absence of a "break clause". This has been widely accepted (including by this author) as a deliberate British ploy to pin down the French, an omission that was later used by the French to deter a UK withdrawal. Having consulted the MoA, Treasury and Cabinet files, I can find no evidence that this was a deliberate British plot. I am more inclined to view it as a classic oversight — and if there was any deliberation here, I tend to believe that the MoA was conspiring against the UK Treasury to obstruct a future cancellation!
31 Reference to draft of Minister of Aviation's statement November 29, 1962, Treasury official November 28, 1962, TNA ref T225/1743
32 *Flight*, December 6, 1962



Buy back-issues and subscriptions direct from www.theaviationhistorian.com

Not online? Not a problem! Call or write and we'll be happy to help — find our contact details on page 3

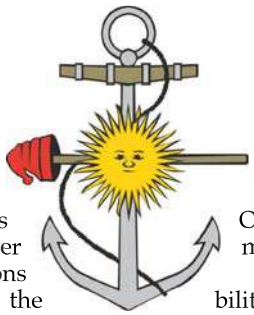


SOUTH OF THE BORDER

ARGENTINA'S CORSAIRS ACROSS THE AMERICAS, 1957

In mid-1956 the Argentinian government secured a contract to provide the country's naval air arm with a force of modern combat aircraft, including several batches of the propeller-driven but rugged and battle-proven Vought F4U Corsair. **SANTIAGO RIVAS** details their procurement and subsequent intercontinental ferry flight — the longest of the type's career





IN THE IMMEDIATE aftermath of the Second World War the *Armada de la República Argentina* (ARA — Argentinian Navy) was keen to acquire an aircraft carrier and absorb the air- and seapower lessons learned by the major powers during the recent conflict. However, owing to the poor relationship between the ARA and the nation's President, Juan Perón, who ruled the country during 1946–55, the Navy's wishes were sidelined. During 1945–46 the ARA had negotiated with British ship manufacturer Vickers-Armstrongs about the construction of a new aircraft carrier, and with Hawker Aircraft Ltd about the provision of up to 100 Sea Furies. Perón's government, however, would not authorise the purchase.

On May 19, 1949, *Guardiamarina* (Midshipman) Román Pacheco became the first Argentinian to alight on a carrier in an aircraft when he took a US Navy North American SNJ aboard the *USS Cabot* (CVL-28) from NAS Pensacola, Florida, where he had undertaken the USN carrier qualification course. At the time, the *Comando de Aviación Naval* (COAN — Naval Air Command) had only one attack escadrille, equipped with North American AT-6 Texans, one bombing escadrille of Beech AT-11s and a few Consolidated PBY-5 Catalinas and Grumman Ducks with some combat capabilities.

In 1954 an Argentinian businessman offered the COAN one Goodyear F2G Corsair, an improved bubble-canopied version of Vought's famous F4U naval fighter, but the offer was rejected.

In April 1955 the ARA requested that funds be made available to have three of its Douglas C-54 transports repaired in the USA and also to modernise with American combat aircraft. A failed rebellion against the President, however, led by the COAN in June 1955 put paid to these plans — at least for the moment. On September 16 the same year, another revolutionary attempt was made, and, thanks to better preparation, it was successful. *[For more on this subject see the author's* Blue on Blue: The Gloster Meteor & The 1955 Revolution in Argentina *in* TAH19 *— Ed.]* Perón was forced into exile and was replaced by Gen Eduardo Lonardi, opening the door to the COAN's expansion and modernisation hopes.

A NEW ERA

Admiral Isaac F. Rojas, commander of the ARA after the revolution, asked Capt Trejo Lema, head of the Aviation Department of the Argentinian Naval Commission to the USA, to negotiate with the Pentagon regarding the provision of modern equipment for the Navy. By means of Secret File No 78 of November 1, 1955, the COAN sent a request to the Naval Operations Commander detailing the materiel it wished to acquire in the USA.

Having positively estimated the possibility of acquiring a *Saipan*-class aircraft carrier or to modify a Liberty ship similar to the *Lancero* in service with the *Flota Argentina de Navegación de Ultramar* (FANU — Argentinian Overseas Navigation Fleet), the COAN requested authorisation to buy 12 Vought F4U-5 Corsairs, 20 Grumman F9F-2 Panther jets, 25 piston-engined Douglas AD-1 or AD-3 Skyraiders, five Lockheed TV-2 jet trainers (navalised T-33s), 20 Lockheed P2V-5 Neptune twin-piston-engined maritime patrol aircraft and six Sikorsky HO3S-1 and four HO4S helicopters.

The American government initially rejected the request for all of these types, on the grounds that they were still in service with the US Navy. Instead, it offered the cheaper F4U-4 Corsair for a unit price of US$8,642 (10 per cent of the type's original price), according to A-F4U-4 Document Case OMAP/Argentine 34, Annex I. However, during June–September 1955 the US Navy retired all of its Korean-conflict-veteran F4U-5s, some of which it agreed to sell to Argentina for US$16,179 each, together with a number of Panthers. The USA refused to sell the Skyraiders and TV-2s, however, because they were still in widespread use and there were no surplus examples available.

The F4U-5 variant of the Corsair had excellent performance, with a service ceiling of 40,000ft (12,000m) and a climb rate of 4,160ft/min (1,270m/min). With full armament the F4U-5 was capable of 460 m.p.h. (740km/h) at 28,500ft (8,700m). In some aspects it was better than many first-generation jets, thanks to its mighty 2,450 h.p. Pratt & Whitney R-2800-32W Double Wasp engine driving a four-bladed propeller.

While the COAN considered this offer, *Capitáns* Hachard and Trejo Lema were sent to Litchfield Park storage facility near Phoenix, Arizona, to inspect and select the 12 best F4U-5 examples, although all were in need of a major overhaul. A study into where such work should be completed concluded that it should be undertaken by a private contractor rather than by the US Navy.

On December 16, 1955, two of the three C-54s sent for repairs (serials 4-T-1 and 4-T-3) arrived in New York, carrying personnel to inspect the Corsairs in Arizona. On December 27 Hachard and Trejo Lema joined *Tenientes de Navío* (Lieutenants) Ambrosini, Vanella and Cuggia.

OPPOSITE PAGE ***One of a rare series of air-to-air colour photographs taken by Argentinian Navy pilot*** **Capitán** ***Hugo Frontroth from his Vought F4U-5 during the ferry flight of 11 Corsairs from the USA to their new home in Argentina during July–August 1957. Corsair 3-C-20 was originally BuNo 121994 in US Navy service.*** VIA AUTHOR



Following the completion of the Argentinian Corsairs' refurbishment by the Aero Corporation at Atlanta's congested main airport, the beefy fighters were moved to Naval Air Station Atlanta, near Marietta, for test and training flights. Here F4U-5 serial 0387, coded 3-C-14 (formerly BuNo 121850), is prepared for another flight at NAS Atlanta in the early summer of 1957.
HUGO FRONTROTH VIA AUTHOR

From Phoenix they went to Chance Vought's HQ in Dallas to negotiate a price for the overhaul of the aircraft at Litchfield Park. The COAN's budget fell short of the maker's quote, however, and the Aero Corporation of Atlanta, Georgia, was selected instead. The somewhat protracted negotiations were finally concluded in mid-1956.

THE CORSAIR NIGHTFIGHTERS

The Litchfield Park aircraft would take some time to overhaul and prepare for delivery, so the COAN began exploring the possibility of acquiring another batch of Corsairs that could be made available sooner. Tenientes Brunet and Cuggia returned to Litchfield Park, where they were shown a mixed batch of 14 F4U-5Ns and F4U-5NLs with only one service tour in the logbook and in good shape, meaning they could be delivered to Argentina with minimal preparation work. Two of the aircraft had suffered accidents and been officially written off, the Panamerican Affairs Department at the Pentagon declaring them invalid for sale. The Argentinians persisted, however, and the pair was made available, although another two had to be removed from the deal to fit the COAN budget, the Argentinians eventually settling for five examples of each variant.

The F4U-5N was a nightfighter variant fitted with radar, the F4U-5NL being a specialised cold-weather nightfighter variant fitted with Goodrich wing and tail de-icing boots and propeller and windscreen de-icing equipment. To be delivered to Argentina by ship, this batch was to be transported by truck to the harbour at Corpus Christi in southern Texas. The Corsairs' wings were removed and the airframes were cocooned in a protective plastic coating. A trucking company was contracted to take the aircraft in two groups of five, travelling only by day. Problems were encountered en route to Corpus Christi, mainly owing to the heat of the desert, but there were also paperwork problems entering Texas and a low bridge that had to be circumnavigated via a time-consuming cross-country route.

By the end of May 1956 the aircraft had all arrived at Corpus Christi, where they were loaded aboard the FANU ship *Overo* during June 7–9. June 9 saw yet another coup attempt back in Argentina, commanded by Gen Juan José Valle, to return Perón to government, but this failed after the bombing of the rebel *Regimiento 7 de Infantería* at La Plata by Meteors of the *Fuerza Aérea Argentina* (FAéA) and the COAN's AT-11s and Texans. Because the possibility of sabotage was anticipated, increased security measures were put in place for the arrival of the Corsairs at Río Santiago harbour and for the transport of the aircraft by land to *Base Aeronaval* (BA) Punta Indio, both close to La Plata. On June 26 the Corsairs arrived at Río Santiago and were released into the custody of *Batallón de Infantería de Marina No 3*, with Texans flying continuous top-cover over the road between the harbour and Punta Indio.

Punta Indio was operated by *Fuerza Aeronaval No 1* (1st Naval Air Force), commanded by *Capitán de Navío* Noriega, of which *Escuadra Aeronaval No 3* (EA3 — 3rd Naval Air Squadron) was a part. This unit was then sub-divided into the *Escuadrilla de Ataque* (EdA, Attack Flight) equipped with Texans; *Escuadrilla de Bombardeo* (EdB, Bomber Flight) with AT-11s, and *Escuadrilla de Propósitos Generales* (EdPG, General Duties Flight) with Stearman PT-17 trainers and Grumman Goose amphibians.



HUGO FRONTROTH VIA AUTHOR

Factory-fresh, and with the distinctive dark paint sweep applied on the forward fuselage to mask the extensive staining from the Double Wasp's exhausts, F4U-5 serial 0394, code 3-C-22 (formerly BuNo 122154), has been fitted with its long-range ferry tanks on the inner wing sections and is parked alongside a US Navy Douglas R4D-8 transport at NAS Atlanta.

Shortly after the purchase of the F4U-5Ns and F4U-5NLs, the Escuadra began the training of pilots for conversion to the Corsair, while Hangar 7 at the base was prepared for the new arrivals. On delivery of the first batch of Corsairs on July 2, the *Dirección de Material Aeronaval* (DMA — Naval Air Materiel Directorate) allocated serials 0374–0383 and markings 3-C-1 to 3-C-10 to the aircraft. *Arsenal Aeronaval No 1* at Punta Indio was tasked with preparing them for service and set about de-cocooning them and installing radiogoniometers taken from retired AT-6s.

INTO SERVICE

On July 19, 1956, the first three F4U-5N/NLs were ready to fly and Capt Tacchella, CO of EA3, elected to make the first flight. Tacchella started the engine at 1452hr and took off with COAN commander Capitán de Navío González Vergara watching. The flight was problem-free, although when Vergara was asked how he was feeling by the tower operator, the pilot answered: "How do you think I feel? My balls are in my throat and this microphone is tightening them!" — heard by all present as the communication system was connected to the base speakers! After Vergara's flight, Tte Pacheco and Capt Cesáreo Goñi took off in their Corsairs, but did not fly in formation for security reasons.

On August 9 that year the *Escuadrilla de Combate* (EdC, Combat Flight) was formed, commanded by Capt Tomás Orsi. Conversion training was stepped up, despite a lack of operation manuals, mechanics with suitable training and the poor condition of the base's runways and taxiways.



The unit's badge was selected by Tte Román Pacheco, deputy commander of the EdC, his idea being to copy a motif from a unit that had used the Corsair in combat. Browsing through a copy of *Approach*, the US Navy and Marine Corps' aviation safety magazine, he found the badge of US Navy unit VF-884 (later VF-144), nicknamed the "Bitter Birds", which had flown the Corsair in the Korean conflict. The badge incorporated a cartoonish rendition of a Jayhawk, which the Argentinians painted in green instead of blue and called *"la lora"* (female parrot, **LEFT**).

Meanwhile, the 12 F4U-5s still in the USA were flown, in poor condition, to Atlanta by US Navy reserve pilots, to start the overhaul programme. On September 26, 1956, a party of COAN pilots and mechanics took off from Ezeiza Airport, near Buenos Aires, in a pair of C-54s bound for Atlanta, where the transports were to receive an overhaul and deliver the pilots for the acceptance and subsequent ferry flights of the 12 F4U-5s to Argentina. The C-54s arrived in Georgia on October 2, and Capt Neldo Baldacci, designated commander of the *Comisión Corsario* (Corsair Commission), found the dozen F4U-5s in the Aero Corporation hangar minus engines, as new surplus powerplants had been purchased and overhauled, but not yet installed.

Work on the F4U-5s progressed slowly, while the Argentinian pilots were sent on training courses, including carrier qualifications using North American T-28Cs. At Litchfield Park, another four F4U-5NLs and one F4U-5P photo-reconnaissance variant (without camera) were



HUGO FRONTROTH VIA AUTHOR

ABOVE ***Initially painted by the Aero Corporation, the batch of F4U-5s was repainted (as seen here) by US Navy personnel at NAS Atlanta, who re-applied the standard COAN scheme of Light Gull Gray uppersurfaces and White undersurfaces, with the national*** **Sol de Mayo** ***insignia in the white section of the blue-white-blue-banded rudder.***

purchased for spares, although these were later used as attrition replacements. Yet another three F4U-5NLs were also purchased as spare airframes and for parts, especially undercarriage spares.

On April 10, 1957, the latter three F4U-5NLs arrived on a truck at Corpus Christi, from where they were taken to Argentina aboard the FANU ship *Campero*, arriving at Río Santiago on April 25. As before, the Corsairs had a military escort for the trip to Punta Indio.

Around the same time, ground testing of the 12 aircraft in Atlanta began — with an immediate problem. During maximum-power tests, the engines were falling short of their full potential. While the technicians tried to find the cause and a solution, Capt Mayorga, chief of operations in the USA, was ordered to return from Miami, where he was saying goodbye to his wife, who was returning to Argentina. On his way back to Atlanta, however, a policeman stopped Mayorga for speeding. The officer asked him what an Argentinian naval pilot was doing in the USA. On hearing his response, the policeman told Mayorga that he was a former US Marine Corps Corsair pilot, and after a brief discussion about the Atlanta problem, the police officer told Mayorga about a Technical Order that could offer a solution. Thanks to the help of the policeman, Mayorga and Capt Hugo Frontroth, the EdC's maintenance chief, began a search for the relevant document, which was found and implemented.

PREPARATION AND TRAINING

On April 30, 1957, the first F4U-5, coded 3-C-17, was flown by the Aero Corporation's test pilot, Naval Reserve Lt Bob MacDougall, who performed a victory roll over the runway to mark a successful first flight. After company pilots had performed initial test flights of the F4U-5s, the aircraft were transferred to the Argentinian pilots for acceptance flights. Baldacci flew them all first, followed by Iglesias, Frontroth and Gomez Villafañe or Ferreira.

After each aircraft had accrued about 5hr flying time, they were declared "in service" and accepted by the Naval Commission. The first example to be flown by Baldacci was 3-C-19 (the first completed), 3-C-17 having experienced technical

BELOW ***One of the COAN Corsairs taxies past a row of parked US Navy Douglas Skyraiders at NAS Atlanta in the early summer of 1957, before embarking on the epic 11-aircraft ferry flight from Georgia to Argentina via Texas, Mexico, Nicaragua, Panama, Ecuador and Peru. Note the anchor insignia on the Corsair's upper wing surfaces.***

HUGO FRONTROTH VIA AUTHOR





HUGO FRONTROTH VIA AUTHOR

ABOVE ***The wreckage of F4U-5 code 3-C-15 (formerly BuNo 121864) after it suffered an engine fire on take-off from NAS Atlanta on June 19, 1957. The code was re-allocated to F4U-5N serial 0432, which was delivered in December 1958 and recoded 2-A-215 in 1960, and which was itself written off in a crash after engine failure in May 1964.***

trouble. The aircraft were painted (badly) in the COAN's standard colour scheme and given codes 3-C-11 to 3-C-22. Baldacci later recalled:

"Flying [the Corsair initially felt like] the biggest disaster in the universe. After flying the Panther [jet], [the Corsair gave] the sensation of flying a stagecoach; an infernal thing, with noise and vibrations . . . I felt like a Martian flying this machine, compared to the silent flight of a jet aircraft. It was slow and *very* noisy. I had the idea that with this aeroplane we would never reach Argentina. [It was] a very different sensation, with this big nose ahead. But the aircraft wasn't guilty — it flew well."

Once the pilots had adapted to the type, they learned to appreciate the performance of this legend of the Pacific War and Korean conflict.

As the Corsairs left the workshop at Atlanta, it soon became apparent that the COAN training flights would have to be transferred to another location; Atlanta's main civil airport was the fifth-busiest in the USA at the time, leading to safety concerns, so the ARA negotiated with the US Navy to relocate the aircraft to NAS Atlanta near Marietta, from which the US Navy was operating Douglas Skyraiders. Co-operation between the COAN team and the base staff was excellent, and with the latter's help state-of-the-art oxygen equipment was installed in the Corsairs and the aircraft were repainted.

On June 19, 1957, an accident at NAS Atlanta almost took the life of Capt Ferreira. Shortly after take-off the engine of Corsair 3-C-15 caught fire at 750ft (230m), forcing Ferreira to bale out. The aircraft inverted and crumpled into a ball of flame below. Ferreira landed in a tree 50ft (15m) from the fireball, releasing his parachute to fall to the ground before losing consciousness, suffering severe burns from the ensuing fire.

The refurbishment programme concluded on July 28, 1957. In preparation, C-54 serial CTA-3 had arrived at Atlanta five days before, tasked with returning the Comisión Corsario mechanics and spares to Argentina.

THE LONG JOURNEY HOME

On July 29 all was ready for the departure of the 11 Corsairs, which were to be ferried to Argentina by air. Having departed Atlanta for Houston, Texas, Capt Frontroth and Tte Hansen experienced trouble with the fuel-transfer system and had to land at New Orleans and Lafayette, Louisiana, respectively.

Two days later six aircraft departed Houston for Veracruz on the Gulf of Mexico, with the other five grounded owing to technical problems. Corsair 3-C-12 had to return to Houston shortly after take-off and Tte Sidotti, flying 3-C-18, noticed that his port auxiliary tank was not transferring fuel, so he made the decision to land at Tampico, Mexico, where he transferred the fuel with a manual pump before continuing on to Veracruz.

Five Corsairs arrived at Veracruz on July 31 to be greeted by a man in a T-shirt and shorts asking them who they were. Frontroth told him the reason for their flight and asked to speak to someone in authority. The man disappeared and returned in uniform, explaining that he was the officer in charge of the base. Frontroth recalled seeing Republic P/F-47 Thunderbolts in very poor condition at the base, and a wall inscribed with the legend *Escuadrón de Pelea*.





HUGO FRONTROTH VIA AUTHOR x 2

ABOVE ***Another of the colour photographs taken by Capt Hugo Frontroth during the ferry flight from the USA to Argentina, this time showing serial 0392, code 3-C-20 (formerly BuNo 121994), with its pair of 150 US gal (567lit) auxiliary fuel tanks clearly visible.***

RIGHT ***Much of the intercontinental ferry flight was flown in surprisingly tight formation, as this snapshot of F4U-5 serial 0391, code 3-C-19, from the cockpit of Capt Frontroth's Corsair, reveals.***

On August 2 the other six Corsairs arrived at Veracruz with the C-54. The following day all except three Corsairs departed for Managua in Nicaragua, the latter pilots having fallen ill, reportedly after eating prawns and ice cream! The eight-aircraft formation flew in three sections, Baldacci commanding the first with three aircraft, Iglesias leading the second flight of three aircraft and Frontroth commanding the third section of two. Baldacci recalled:

"Over that region and particularly over the airport [at Managua] we encountered a lot of stormy clouds, so I divided the group into pairs to make the approach and landing easier. We all landed without trouble until it was the turn of Gómez Villafañe and Sidotti. Gómez Villafañe's radio had some problems and he didn't hear the tower giving the order to leave the runway at the first exit and not taxy to the end of the runway.

"Gómez Villafañe landed in formation with Sidotti and, according to COAN practice, taxied at speed to the end of the runway to leave it via the last exit. Sidotti, unable to communicate with his leader, followed him very closely, zig-zagging with the aircraft to look forward. At this point they saw dispersal areas on both sides of the taxiway, in which were P-51 Mustangs, machine-guns, refuelling vehicles — and a lot of people armed with rifles and machine-guns looking at them in a hostile manner."

The* Fuerza Aérea de Chile *(FACh) operated a total of 38 Douglas B-26B/Cs from 1954. This FACh B-26B, "846", was originally 44-35937, and, after a long spell as a gate guardian at El Bosque air base, near Santiago, it was moved in 1997 to Jackson Barracks Military Museum in New Orleans.

DAN HAGEDORN COLLECTION





MAP BY MAGGIE NELSON

> THE ESCADRILLE WAS OVER THE PACIFIC COAST. TO OUR LEFT, WE COULD JUST SEE ENDLESS JUNGLE. IN SOME PLACES THERE WERE SMOKE COLUMNS RISING FROM THE FOREST. TO OUR RIGHT WAS THE ENDLESS, INTENSE BLUE OF THE PACIFIC OCEAN. WE WERE FLYING IN SILENCE, MADE DROWSY BY THE DRONE OF THE ENGINES, WHEN SOMEBODY SAID OVER THE INTERCOM: 'GUYS, IF THE ENGINE STOPS, CHOOSE SHARKS OR CANNIBALS!'. . .

Eventually joining his fellow Argentinians at the civil airport, Sidotti asked what was happening. The answer was that Nicaragua and Honduras were on the verge of war over a territorial dispute — the Mocorón conflict — which explained the dispersal of the aircraft, but not the faces of the people. This, it was explained, was because the *Fuerza Aérea Hondureña* was also equipped with F4U-5s, painted with flags very similar to those of the Argentinians!

Having refuelled at Managua, the eight Corsairs then took off for Albrook Field in the Panama Canal Zone (an unincorporated territory of the USA at that time), where the pilots waited for three days for the three stragglers, using the time to undertake a thorough inspection of their aircraft using the base's extensive facilities.

On August 7, nine of the 11 Corsairs departed for Guayaquil in Ecuador, one having had a problem before take-off, the section leader electing to stay with him and the C-54 until the problem could be fixed. The departing Corsairs had their oxygen bottles full for the crossing of the mighty Andes. As Baldacci recalled:

"The escadrille was at about 9,000ft [2,700m] over the Pacific Coast. To our left, over Panama first, then Colombia and finally Ecuador, we could just see endless jungle. In some places there were faint smoke columns rising from the forest. To our right was the endless, intense blue of the Pacific Ocean. We were flying in silence, made drowsy by the drone of the engines, when somebody said over the intercom: 'Guys, if the engine stops, choose sharks or cannibals!'".

The nine Corsairs arrived at Simón Bolívar airport in Guayaquil at 1100hr, the other two arriving a few hours later.

INTO PERU

On August 8 the group flew to Trujillo in coastal north-western Peru and on the following day to Pisco, south of Lima. The latter was avoided because the old airport, Limatambo, was often subject to instrument flight rules conditions and it was deemed an unnecessary risk to land there.

On August 11 all the Corsairs departed Pisco for Antofagasta in northern Chile, where, on arrival, they parked alongside a *Fuerza Aérea de Chile* squadron equipped with Douglas B-26B/C Invaders. Baldacci remembered: "We made plans for the crossing of the Andes, trying to fly direct to Salta or Tucumán over the 6,000m (20,000ft) Socompa volcano [in north-west Argentina]. The idea was to reach Punta Indio on the same day, after refuelling at Tucumán. As we could not guarantee that we would find enough fuel there, we decided to fly to San Juan and make a stop in Mendoza [in western Argentina] instead".



HUGO FRONTROTH VIA AUTHOR

ABOVE ***Flying in a much looser formation, the Corsairs push across Central America during the ferry flight in August 1957. The nearest to the camera, 3-C-20, was written off in a deck landing accident aboard carrier*** **ARA Independencia** ***on October 16, 1959. The pilot was unhurt but a crewman was killed after being hit by the propeller.***

On August 12 the cloudbase at Antofagasta was very low, and crossing the mountains under such conditions was deemed unnecessarily risky, so the flight was postponed. The following day the clouds were thinner, despite a ceiling of 500ft (150m), so the decision was made to depart. As the Corsairs skimmed the tops of the clouds, two Chilean Invaders emerged from the clouds below, performing barrel-rolls as a salute to the Argentinian aircraft. Baldacci recalled: "Those who saw this manœuvre were impressed — although I don't know whether by the ability of the pilots or by their lack of concern about colliding within the clouds!"

Pilot Vasallo remained at Antofagasta owing to engine problems, together with Ambrosini. The other nine flew south until reaching Ovalle, where they turned east to cross the Andes at 23,000ft (7,000m). Fine weather in the area greatly aided a safe crossing and, after flying over San Juan, they headed to Mendoza, where the group landed at the home of the FAeA's *IV Brigada Aérea*. Vasallo and Ambrosini crossed the Andes further to the south and arrived shortly after the main group. While over the mountains, Ambrosini's engine coughed violently and threatened to stop. Vasallo recited the emergency procedure over the R/T to refresh his wingman's memory, the latter adjusting the control of the automatic power unit, which solved the problem.

The Corsairs remained overnight at Mendoza, departing the following day, the 14th, for Punta Indio, where they were welcomed, having completed the longest ferry flight ever undertaken in the type's history.

With the Corsairs' arrival, the *Flotilla de Combate* was established as part of EA3, comprising two escadrilles; one for day operations, equipped with the F4U-5s and another for night operations, with F4U-5N/NLs.

AN OLD WARRIOR FOR ARGENTINA

The following month British aircraft carrier *HMS Warrior*, a veteran of the Korean conflict, visited Buenos Aires and *Base Naval* Puerto Belgrano while returning from nuclear tests in the Pacific Ocean. At the time, the Royal Navy was retiring its *Colossus*-class light carriers and *Warrior* was due to leave service on its return to the UK. Seeing an opportunity, the ARA inspected the ship during its visit and opened negotiations to buy it. On September 16, 1958, *HMS Warrior* was officially handed over the Argentinian Navy and renamed *ARA Independencia* (V-1), arriving at Puerto Belgrano on December 30.

On August 13, 1958, the Flotilla de Combate was re-established as the *Segunda Escuadrilla Aeronaval de Ataque* (2nd Naval Air Attack Squadron) and in March 1959 *Práctica en Tierra de Aterrizaje en Portaaviones* (similar to the Royal Navy's Assisted Dummy Deck Landing training) began with AT-6s and Corsairs on a runway simulating a flight deck at Punta Indio. On March 10 the first deck-landing of an Argentinian Corsair on an aircraft carrier took place — beginning a new era in Argentinian naval aviation.

THE ARGENTINIAN *COMANDO DE AVIACION NAVAL'S* CHANCE VOUGHT F4U-5/5N/5NL CORSAIRS

Serial	Code	Former i/d	Delivered	Comments
0374	**3-C-1**	BuNo 124705	2.7.56	(5NL) Became **2-A-201** on 5.3.59; to **3-A-201** in 8.60; written off (w/o) on 16.10.64
0375	**3-C-2**	BuNo 124699	2.7.56	(5NL) W/o near Caleta Olivia, Santa Cruz, on 15.8.58
0376	**3-C-3**	BuNo 124514	2.7.56	(5NL) became **2-A-203** on 5.3.59; damaged at BAN Puerto Madryn on 21.2.60; repaired; to **3-A-203** in 8.61; wfu 1966
0377	**3-C-4**	BuNo 122206	2.7.56	(5NL) Became **2-A-204** on 5.3.59; damaged on 14.10.59; repaired; to **3-A-204 (1)** in 8.60; later w/o, date unknown
0378	**3-C-5**	BuNo 122192	2.7.56	(5NL) Became **2-A-205** on 5.3.59; to **3-A-205** in 8.60; wfu 1966
0379	**3-C-6**	BuNo 124703	2.7.56	(5N) Became **2-A-206** on 5.3.59; crashed in 2.60; later repaired to become **3-A-206** in 1961; wfu 1965
0380	**3-C-7**	BuNo 122038	2.7.56	(5N) Damaged in landing accident, Punta Indio, 19.6.57; to **2-A-207** on 5.3.59; repaired; w/o at Punta Indio 25.11.59
0381	**3-C-8** (1)	BuNo 123203	2.7.56	(5N) W/o at BAN Commandante Espora on 29.7.57
0382	**3-C-9**	BuNo 124559	2.7.56	(5N) Became **2-A-209** on 5.3.59; to **3-A-209** in 8.60; wfu 27.11.65, scrapped
0383	**3-C-10**	BuNo 122183	2.7.56	(5N) Became **2-A-210** on 5.3.59; to **3-A-210** (1) in 8.60; w/o while operating from *ARA Independencia* on 23.9.61
0384	**3-C-11**	BuNo 121794	14.8.57	(5) Mid-air collision with 3-C-12 on 29.11.57; later repaired to become **2-A-211** on 5.3.59; to **3-A-211** in 8.60; w/o on 2.4.63
0385	**3-C-12**	BuNo 121821	14.8.57	(5) Mid-air collision with 3-C-11 on on 29.11.57; later repaired to become **2-A-212** on 5.3.59; to **3-A-212** in 8.60; wfu in 1966
0386	**3-C-13**	BuNo 121836	14.8.57	(5) W/o at Ezeiza on 29.4.58; used at *Escuela de Mecánica de la Armada* for ground training
0387	**3-C-14**	BuNo 121850	14.8.57	(5) Became **2-A-214** on 5.3.59; to **3-A-214 (1)** in 8.60; crashed into the sea near San Clemente del Tuyú on 23.1.63
—	**3-C-15**	BuNo 121864	19.5.57	(5) W/o before delivery at Atlanta, USA, on 19.5.57
0388	**3-C-16**	BuNo 121866	14.8.57	(5) Became **2-A-216** on 5.3.59; to **3-A-216** in 8.60; w/o after engine failure on landing at BAN Com Espora on 7.2.64
0389	**3-C-17**	BuNo 121881	14.8.57	(5) Became **2-A-217** on 5.3.59; to **3-A-217** in 8.60; to **3-A-202 (2)** in 4.64; wfu 1966; gate guardian at BA Almirante Zar 1968–89; to USA to become airworthy N43RW *Annie Mo*; currently at Lone Star Flight Museum, Texas, USA
0390	**3-C-18**	BuNo 121927	14.8.57	(5) Became **2-A-218** on 5.3.59; to **3-A-218** in 8.60; to **3-A-210 (2)** in 4.64; w/o near Cañadón Seco on 9.11.65
0391	**3-C-19**	BuNo 121928	14.8.57	(5) Became **2-A-219** on 5.3.59; to **3-A-219** in 8.60; to **3-A-211** in 4.64; wfu 1965; to *Museo de la Aviación Naval*, Com Espora
0392	**3-C-20**	BuNo 121994	14.8.57	(5) Became **2-A-220** on 5.3.59; w/o while operating from *ARA Independencia* on 16.10.59
0393	**3-C-21**	BuNo 122031	14.8.57	(5) Became **2-A-221** on 5.3.59; to **3-A-221** in 8.60; wfu 1965
0394	**3-C-22**	BuNo 122154	14.8.57	(5) Became **2-A-222** on 5.3.59; w/o 5.60
0395	**3-C-8** (2)	BuNo 124685	3.58	(5NL) Became **2-A-208** on 5.3.59; to **3-A-208** in 8.60; wfu 1965
0432	**2-A-215**	BuNo 124701	23.12.58	(5N) Became **3-A-215** in 8.60; to **3-A-214 (2)** in 4.64; w/o after engine failure at BAN Com Espora on 7.5.64
0433	**2-A-202**	BuNo 124541	23.12.58	(5NL) Became **3-A-204 (2)** in 8.60; wfu 1966; on display at *Museo Naval,* Tigre, 1969–91; to France 1994; airworthy as F-AZYS from 3.2000
0434	**2-A-223**	BuNo 124678	23.12.58	(5NL) Became **3-A-202 (1)** in 8.60; w/o at Punta Indio 23.11.60
0435	**2-A-224**	BuNo 124707	23.12.58	(5NL) Became **2-A-213** in 1959; to **3-A-213** in 8.60; wfu 11.1965

The COAN Corsairs were later painted in a Dark Sea Blue overall scheme, with white codes and insignia. This F4U-5NL — note the nightfighter radar pod on the starboard outer wing — is serial 0374 (formerly BuNo 124705), initially 3-C-1, but recoded 2-A-201 in 1959 and 3-A-201 the following year.



FROM NILE EAGLE TO NASSER'S FOLLY

THE HISPANO/HELWAN HA-300

Conceived by legendary German aircraft designer Willy Messerschmitt in Spain and fully developed in Egypt with a British engine — before being test-flown by an Indian test pilot — the HA-300 lightweight delta jet fighter was a truly international affair. **JOÃO PAULO MORALEZ & NICK STROUD** trace the full history of Egypt's exotic but financially ruinous Cold War status symbol



IN THE WAKE of the 1948–49 Arab-Israeli War, Egypt sought to strengthen its combat capability by acquiring new state-of-the-art equipment, particularly jet fighters. The Egyptian government had the support of the UK, which offered the single-engined de Havilland Vampire and Gloster's twin-engined Meteor. However, beyond simply buying ready-made products, Egypt also sought to develop its national aviation industry by encouraging its engineers and technicians to design and produce its own next generation of aircraft.

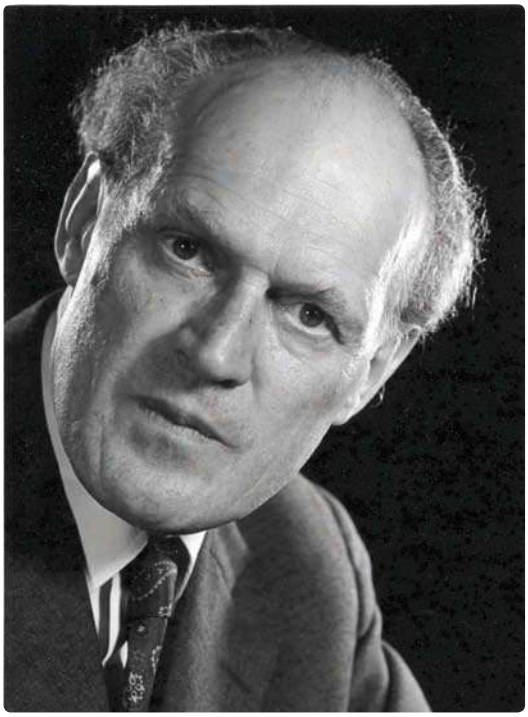
As a first step, Czechoslovakia provided a licence for the Egyptians to build the Zlin Z.381, itself a licence-produced version of the German Bücker Bü 181D Bestmann. Named Gomhouria (Republic) by the Egyptians, six variants of the aircraft were developed at the State Aircraft Factory at Heliopolis, these including export versions for Jordan, Sudan and Saudi Arabia.

In 1950 the majority of the aircraft operated by the Royal Egyptian Air Force (REAF), as it was then, were of British design and origin. However, a decision was made by the British in October 1951 to impose an embargo on the sale of military equipment to Egypt in an attempt to preserve a balance of power in the region. Egypt thus turned to the Soviet Bloc and Czechoslovakia to re-equip its air force, but not before 30 Italian-built Vampire FB.52s had been acquired for the REAF. In 1955 a three-year trade agreement was agreed jointly with the Soviet Union and Czechoslovakia, leading to the delivery of £150m-worth of military equipment and the arrival in country of numerous Russian and Czech engineers and technicians.

By the end of the 1950s another aircraft development centre had been established, at Helwan, on the banks of the Nile about 20 miles (32km) south of Cairo. A former RAF base established during the First World War, Helwan was used operationally during the Second World War and, after its post-war return to the Egyptians, had the benefit of a long runway. It was at Helwan that Egypt's main aircraft design authority was established in the 1950s, although it was not officially opened until July 1962.

LOOKING TO THE FUTURE

With the establishment and consolidation of an indigenous aerospace industry — including an ambitious rocket programme staffed by under-employed designers and engineers from Germany — Egypt turned its attention to the development of a more sophisticated manned

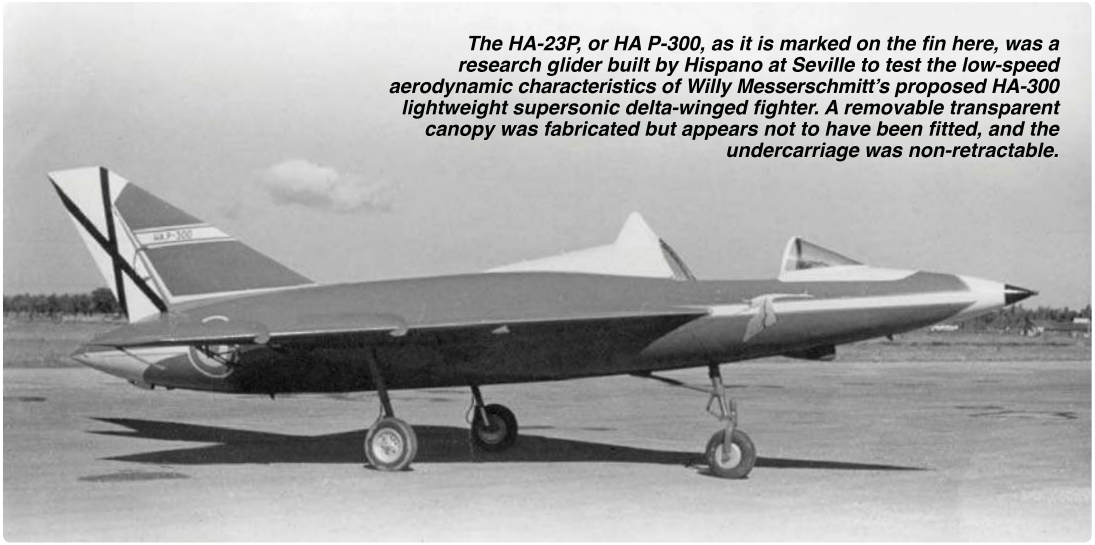


aircraft. This was to be an agile single-engined lightly-armed lightweight all-weather fighter of simple construction with low acquisition and operation costs. In the 1960s these were the ideal requirements of any air force looking to equip its squadrons with a jet fighter to form the backbone of its air-defence capabilities to the farthest corners of its territory. It was important for Egypt to stay independent of foreign suppliers and potential international embargoes.

By the early 1960s Egypt was still engaged in local confrontations and skirmishes with Israel, but the prospect of further all-out conflict had diminished. The country was also experiencing an improvement in its economy, and the outlook for homegrown technological development was good. As mentioned, Egypt was able to attract the services of a pool of highly skilled but under-employed European designers, engineers and technicians. One such designer was Professor Willy Messerschmitt, creator of some of the most famous fighting aircraft of the Second World War.

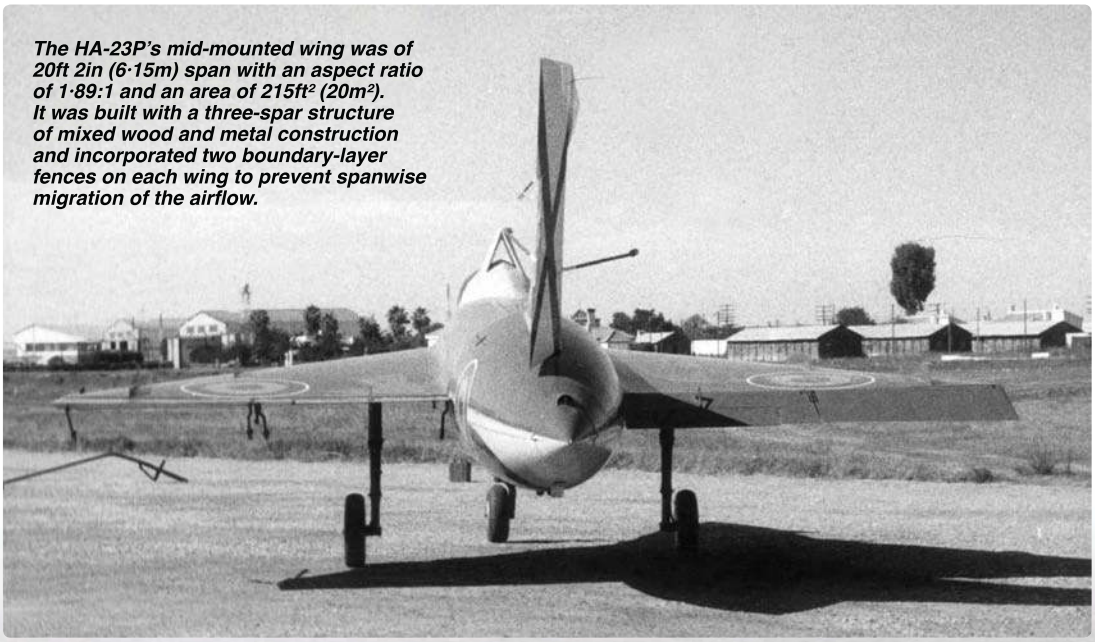
For Messerschmitt and many of his fellow German designers, the end of the war also represented the end of their careers in their homeland, as the nation was prohibited from developing or building military equipment.

OPPOSITE PAGE ***One of a series of photographs taken of the second HA-300 prototype at the Helwan works in Egypt, by German journalist and former Messerschmitt Me 163 test pilot Mano Ziegler.*** **ABOVE** ***A characteristically intense portrait of aircraft designer Wilhelm Emil "Willy" Messerschmitt (1898–1978) taken in 1958.*** TAH ARCHIVE x 2



The HA-23P, or HA P-300, as it is marked on the fin here, was a research glider built by Hispano at Seville to test the low-speed aerodynamic characteristics of Willy Messerschmitt's proposed HA-300 lightweight supersonic delta-winged fighter. A removable transparent canopy was fabricated but appears not to have been fitted, and the undercarriage was non-retractable.

PHILIP JARRETT COLLECTION



The HA-23P's mid-mounted wing was of 20ft 2in (6·15m) span with an aspect ratio of 1·89:1 and an area of 215ft² (20m²). It was built with a three-spar structure of mixed wood and metal construction and incorporated two boundary-layer fences on each wing to prevent spanwise migration of the airflow.

TAH ARCHIVE x 2

The HA-23P glider undertook several towed flights, initially behind a motor car and then with the help of a licence-built Heinkel He 111. The nosewheel left the ground at 180km/h (112 m.p.h.) and the glider took off at 195km/h (121 m.p.h.). The towing cable was then cast off at 200–250km/h (125–155 m.p.h.). The machine was found to be unstable in flight, however, and the Spanish government decided against further development.





TAH ARCHIVE

ABOVE ***The fuselage of the HA-23P was constructed in two parts, the forward portion in metal and the rear section of wooden structure. The glider's length was 33ft 6in (10·2m), which included a tailcone fitted with an anti-spin parachute. The loaded weight of the machine was 2,755lb (1,250kg) with a wing loading of 12·8lb/ft² (62·5kg/m²).***

After two years in prison for exploiting slave-labour during the war, Messerschmitt returned to his eponymous company and turned his hand to designing non-aeronautical machinery, including sewing machines, prefabricated buildings, and, famously, the *Kabinenroller* car.

THE SPANISH CONNECTION

Messerschmitt's post-war aeronautical career picked up again in 1951 when, after a visit to the Hispano Aviación SA factory in Seville, Spain, he made a proposal to the Spanish government for the development of a light supersonic jet fighter. Working under the dictatorship of Gen Franco, Messerschmitt was given a great deal of freedom in which to work; and, on October 26, 1951, Messerschmitt signed a contract with Hispano. The first result was the all-metal piston-engined HA-100 Triana advanced two-seat trainer, which made its maiden flight on December 10, 1954, although owing to engine-availability issues the type never entered full-scale production.

Messerschmitt's next venture for Hispano was the HA-200 Saeta (Arrow) twin-engined advanced jet trainer, originally designed to incorporate as many of the basic components of the HA-100 as possible, and which made its first flight on August 16, 1955. This was a much more successful design and saw service with the *Ejército del Aire* (Spanish Air Force). With these two trainers under his belt, Messerschmitt was keen to get to work on his proposed lightweight supersonic fighter.

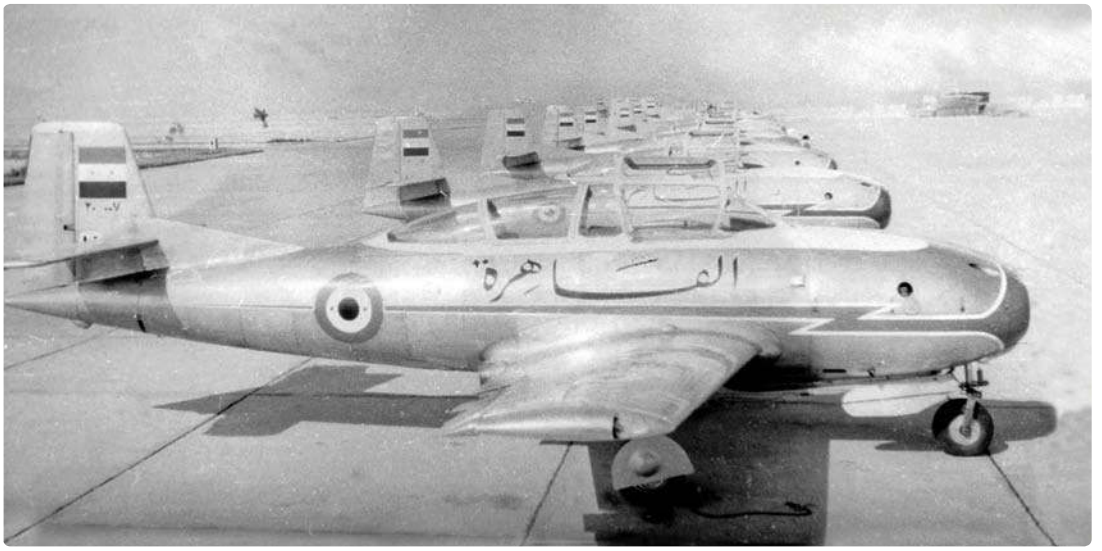
The Spanish were interested in exploring the possibilities of a lightweight jet-powered single-seat point-defence day fighter capable of speeds of up to Mach 1·5 at altitude. The earliest documents relating to the HA-300 project, as it was designated, are dated July 1952, and contain various configuration proposals, including a delta planform with a finely streamlined body. There would be numerous obstacles in developing such an ambitious design, however, including the obtaining of a suitable powerplant; another would be how to overcome the issue of potentially problematic in-flight stability. To address the latter, in 1959 Messerschmitt designed a proof-of-concept glider, designated the HA-23P, although it was also referred to (and marked on the fin) as the "HA P-300", to undertake research into the design's low-speed aerodynamic characteristics.

According to a report in the July 22, 1960, issue of *Flight*, "most of the early flights were accomplished by towing from a car . . . better results were obtained by air-towing behind a CASA 2.111 [licence-built Heinkel He 111], when it was found that the controls were 'very effective'". Data collected during windtunnel tests of the design suggested that the aircraft would be very unstable in flight, requiring a series of modifications that ultimately discouraged the Madrid government from continuing with the project.

By the end of 1960, the Spanish had concluded that such a design was a luxury the nation could ill-afford. Yet it was not the end of the road for Professor Messerschmitt's ambitious delta.

TO THE NILE

In 1958 a team of Egyptian technicians and pilots visited Hispano's headquarters with a view to evaluating the HA-200 Saeta, the Egyptian President, Gamal Abdel Nasser, having decided that a simple jet trainer should be built under licence in Egypt (known as the United Arab



TAH ARCHIVE

ABOVE ***The first Egyptian-built HA-200B Al Kahira made its maiden flight in December 1961, the type entering service to be used for advanced flying training by the Egyptian Air Force Air Academy at Bilbeis. The HA-200B replaced the Spanish A-model's nose-mounted machine-guns with 20mm cannon and incorporated wing hardpoints.***

Republic during 1958–71) in order to provide manufacturing experience for the nation's fledgling aviation industry. After negotiations between the Spanish and Egyptians, the latter were granted a licence in December 1959 and a production line for the HA-200, to be known as the HA-200B Al Kahira (Conqueror), was established at Helwan, more than 60 examples ultimately being built there.

While in Spain, the Egyptian contingent was also shown the work that had been undertaken on the HA-300, which was deemed an ideal candidate for further development in Egypt and the potential genesis of the nation's first jet fighter programme. After a series of negotiations, all design documents, materials and tooling for the HA-300 were moved to Helwan, along with a large number of Spanish engineers and Willy Messerschmitt. More designers and technicians were also imported from other European nations, most notably West Germany, although this arrangement caused some embarrassment to the latter nation's government, and it was actively discouraged.

According to the agreement between Messerschmitt and the Egyptian government, based on documents acquired in Spain, the HA-300's maximum take-off weight was not to exceed 4,065kg (8,960lb) and it should be capable of a maximum supersonic speed of at least Mach 1·5. In addition, Egyptian engineers and technicians must participate fully in the development of the aircraft and receive specific training from the Europeans when necessary, all aimed at training local skilled manpower for the development of Egypt's future aviation industry. In practice the Egyptians were largely spectators, given very little direct engineering experience during the development programme, although they were given ample opportunity to observe and learn.

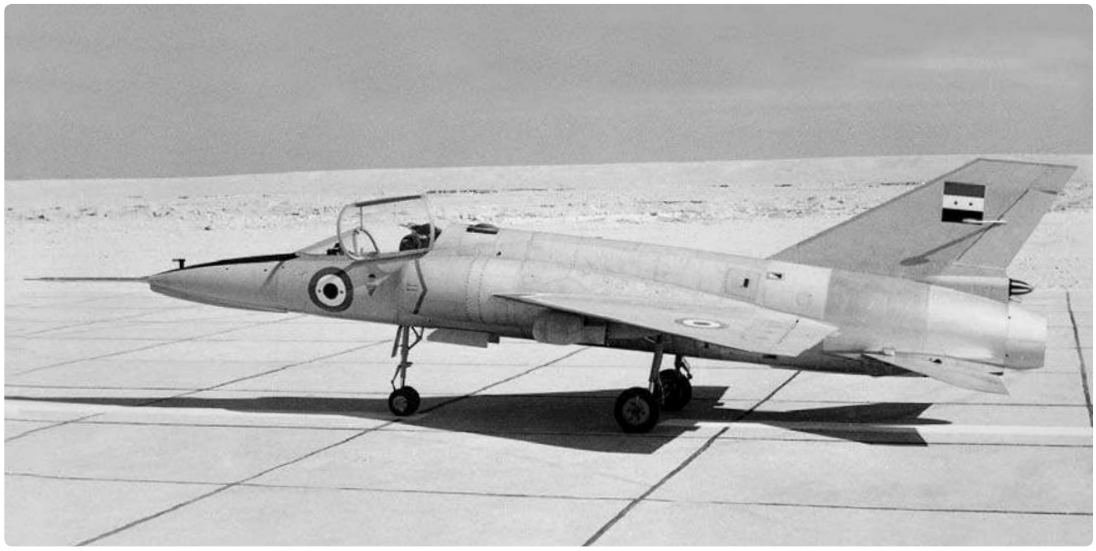
Whereas the HA-23P/P-300 glider had been a tailless pure delta design, the HA-300 incorporated a delta wing with a low-set tailplane, a similar configuration to the Soviet Union's MiG-21 jet fighter, although the Egyptian fighter, originally to be powered by a British-designed and -built Bristol Siddeley Orpheus turbojet, would never rival its Russian counterpart for performance. The HA-300 did, however, have what was probably the world's thinnest Duralumin wing, with a thickness-to-chord ratio of just four per cent.

In September 1960 a ⅓-rd scale model of the HA-300 was built and sent for subsonic windtunnel testing at the *Eidgenössische Flugzeugwerke* (EFW) at Emmen in Switzerland, and the following year it reportedly underwent supersonic windtunnel testing at the Royal Aircraft Establishment (RAE) at Bedford in the UK. The results were deemed satisfactory at both, showing that Messerschmitt was on the right track after a number of modifications to the original design had been made.

THE REAL THING

The HA-300 prototype's wing incorporated leading-edge sweep of 57° 30' with inset ailerons, each with a large trim tab. The fuselage was of conventional all-metal semi-monocoque structure of largely circular section with a prominent stabilising strake under the nose.

The tailplanes were low-set one-piece cantilever all-moving structures. The fin incorporated a rudder, with a mass-balance added on the second prototype, with no tabs.



PHILIP JARRETT COLLECTION

ABOVE ***The two HA-300 flying prototypes were extremely similar, the tell-tale differences between the two being a blade antenna aft of the cockpit on HA-300-01, missing from the second prototype, which incorporated a mass-balance on the rudder; the absence of the former and presence on the latter reveal this to be HA-300-02.***

The undercarriage was of the retractable tricycle type, with a twin-wheel nose unit and a single wheel on each main unit. The nosewheel retracted rearwards, while the mainwheels retracted forward into the engine air-intake trunks. A small tail bumper was also provided in case of over-rotation. Many of the components, including the Martin-Baker MS4E ejection-seat, and much of the avionics equipment for the prototype, was to be supplied by British, West German and Swiss manufacturers, somewhat undermining the independence of Egypt's nascent aerospace industry.

As it had been in Spain, one of the most pressing problems was determining the ideal engine for the type. Following Bristol Siddeley's cancellation of the supersonic afterburning Orpheus BOr.12, Messerschmitt's preferred powerplant for the HA-300, the designer secured the services of Austrian engineer Dipl-Ing Ferdinand Brandner in October 1960, to design an entirely new engine for the aircraft. Brandner had participated in the German war effort and in the immediate post-war period played a major part in the development of the Soviet Union's immensely powerful Kuznetsov NK-12M turboprop engine. Designated the E-300, Brandner's powerplant for the HA-300 was to be of small dimensions and equipped with an afterburner system in order to achieve supersonic speeds.

Along with Brandner, the Swiss-Egyptian proprietor of the Zürich-based Maschinen-Turbinen-Pumpen AG, Hassan Kamil, was also employed by the Egyptians as a personnel contractor, and hired some 450 German, Austrian, Swiss and Spanish technicians to lend their expertise to the project. With the development of the new powerplant under way, and a capable workforce established to bring the project to fruition, the first flight of the HA-300 was planned for 1963.

AN INDIAN AMONG THE PHARAOHS

By 1963 the prototype HA-300 was almost ready to fly, but Messerschmitt had yet to find a suitably experienced test pilot to fly it. Clearly, he would have to look outside the Egyptian Air Force (EAF). President Nasser contacted his Indian counterpart, Prime Minister Jawaharlal Nehru, to ask for his support in solving the problem. Thus, in June 1963, former Hindustan Aeronautics Ltd (HAL) chief test pilot Kapil Bhargava, Indian Air Force (IAF), arrived in Helwan — much to the displeasure of Messerschmitt and his team, who wanted a European test pilot.

Reportedly, Bhargava's reception at Helwan was anything but friendly, particularly by the Europeans. He was told early on that he would not be flying the HA-300, and that he may be allowed to undertake production test-flights of HA-200Bs, but nothing more ambitious. To make matters worse for Bhargava, the EAF commander, Air Marshal Mohamed Sedky Mahmoud, claimed that he could not intervene. After some strong conversations with the Indian pilot, it was decided that Bhargava should "keep an eye on the HA-300", as he recalled, but without being allowed to fly it.

This policy was changed by circumstance a few days later when members of the EAF High Staff Command called for the HA-300 to taxy past Nasser's presidential platform during that year's annual celebration of the 1952 Egyptian Revolution on July 23. Much to the chagrin of the







TAH ARCHIVE x 2

BHARAT RAKSHAK

TOP ***Another view of the second prototype, this time from the starboard side, clearly showing the tail-heavy attitude of the aircraft while on the ground.*** **ABOVE LEFT** ***The first prototype, without the rudder mass-balance, beside the factory at Helwan.*** **ABOVE RIGHT** ***One of India's most distinguished aviators, Gp Capt Kapil Bhargava.***

Germans, the only available pilot was Bhargava. Messerschmitt and his team grudgingly made adjustments to the aircraft, which then began taxying trials. Initially the nosewheel exhibited a tendency to shimmy when passing over uneven tarmac. After the problem was corrected, the prototype passed the presidential platform powered by one of the Orpheus 703 engines that had accompanied the aircraft from Spain. Bhargava later recalled:

"That was the only time I met President Nasser in person. He was accompanied by Anwar Sadat, who later became the President of Egypt. I explained to Nasser the layout and most interesting features of the jet, and he asked my opinion about the 'plane. In my reply, I hinted that it was a very interesting research project, but that it would not become an effective military device. He just smiled."

After the Germans' attempts to find a suitably qualified European test pilot failed, Bhargava was invited by the Egyptians to undertake the maiden flight of the HA-300. Bhargava refused, pointing out that the aircraft had at least 19 critical design issues to be addressed, most relating to the pilot's safety. He later explained:

"On being told of my fears, Professor Messerschmitt said that he had not wanted 'a bloody Indian pilot', as he was sure to be 'chicken'. My response was that I was not just chicken — I was s**t scared! I said I would be very dead if I tried to fly the aircraft until its deficiencies were removed. To settle the dispute we invited Wg Cdr Suranjan Das of HAL to give his opinion on the aircraft's hazardous design features. He took my list of dangerous features and completely confirmed my views. He sent six copies of my report with a covering letter informing all concerned authorities that no Indian test pilot should be permitted to fly the aircraft until its shortcomings were eliminated. I thus became the only pilot available for the HA-300 prototype's first flight."

A few days later, Bhargava had a meeting with

HISPANO / HELWAN HA-300 DATA

Powerplant 1 x 4,850lb-static thrust Bristol Siddeley Orpheus 703 turbojet or 1 x 6,275lb-s.t. (10,580lb-s.t. with afterburner) Brandner E-300 turbojet engine

Dimensions

Span	5·84m	(19ft 2in)
Length	12·40m	(40ft 7in)
Height	3·15m	(10ft 3½in)
Wing area	16·7m²	(179·75ft²)
Leading edge sweepback	57° 30'	
Wing loading	125·75kg/m²	(25·75lb/ft²)

Weights

Empty	2,100kg	(4,630lb)
Loaded	5,443kg	(12,000lb)

Performance

Maximum speed	Mach 1·7; Mach 2 with Brandner engine (intended)	
Climb (intended)	12,180m/min	39,960ft/min
Service ceiling	18,000m	(59,000ft)
Normal range	1,400km	(870 miles)

Armament (intended)
2 x 30mm Hispano or 4 x 23mm Nudelman-Rikhter NR-23 cannon + 4 x infrared homing air-to-air missiles

Messerschmitt and his team. He recalled:

"It looked like a 'kangaroo court'. Sitting at a large table was Professor Messerschmitt with an interpreter. On one side sat the German chief engineer and on the other his Egyptian counterpart. I, the accused, was in an inferior position. Professor Messerschmitt asked why I was insisting on the modifications which I had declared to be essential for ensuring [my] safety. I was already annoyed and explained that those were my requirements to fly the HA-300. Otherwise, they could call another test pilot, and I'd be happy to return to India. Many German faces turned red upon hearing my reply."

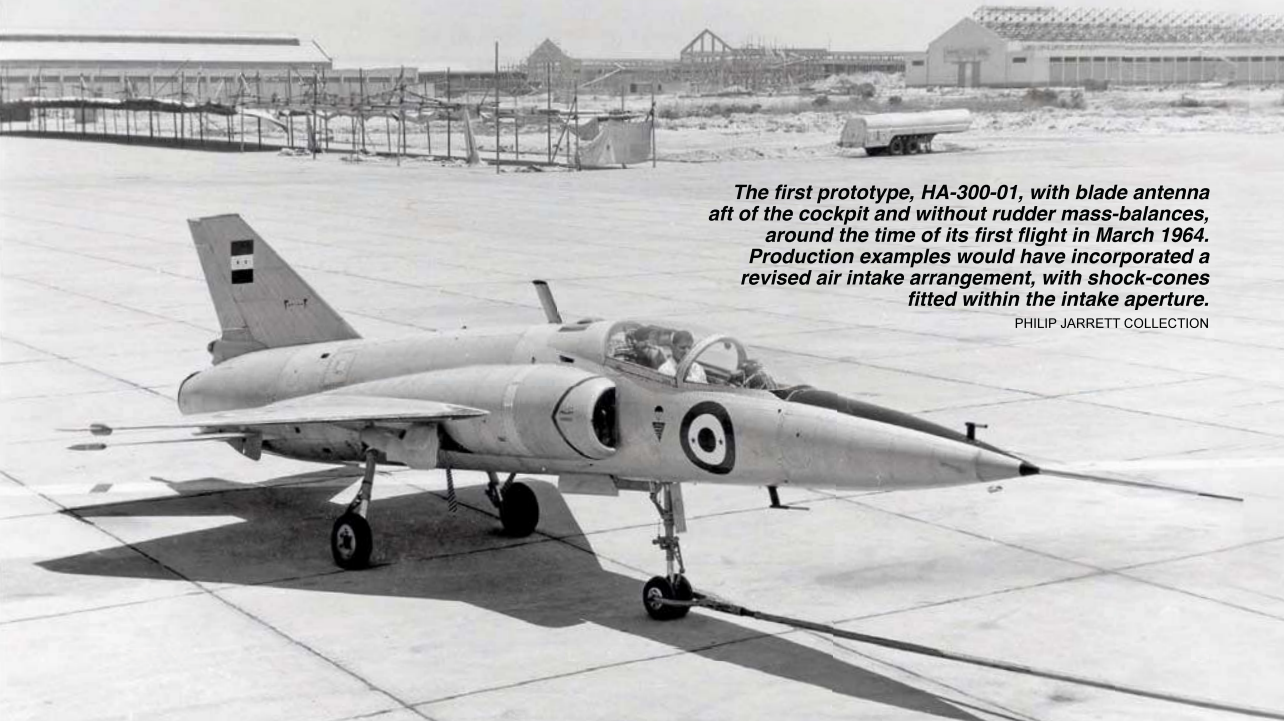
Messerschmitt, taking a diplomatic approach, calmed his staff and asked Bhargava to comment on each of his points.

"It did not take him long to realise he was wrong. Professor Messerschmitt got up from the chair and shook my hand. He assured me that all necessary steps would be taken, and that he would instruct his staff to follow my directions."

It took six months for Bhargava's list to be fully addressed, resulting in a delay of almost a year from the initial forecast of the maiden flight. By that time the Egyptians had changed the specification for the aircraft, which was now required to be capable of at least Mach 2.

FIRST FLIGHT AND TEST PROGRAMME

On March 7, 1964, Bhargava settled into the seat of the the first prototype (HA-300-001), started the Orpheus 703 engine and taxied out to the Helwan runway to make his final checks. When he was satisfied all was ready, the Indian pushed the throttle, released the brakes and, a few moments later, took off. Two HA-200s sent up as chase aircraft formated on the sleek diminutive fighter at a safe distance. After a 12½min flight, the aircraft returned to the airfield and landed, after which it was surrounded by an enthusiastic crowd comprising local press and guests of honour, who were thrilled by the flight of the first jet aircraft to be (partly) designed and (fully) built in



The first prototype, HA-300-01, with blade antenna aft of the cockpit and without rudder mass-balances, around the time of its first flight in March 1964. Production examples would have incorporated a revised air intake arrangement, with shock-cones fitted within the intake aperture.

PHILIP JARRETT COLLECTION



KAPIL BHARGAVA VIA JOÃO PAULO MORALEZ x 2



ABOVE ***The instrument panel of the first prototype was comparatively simple for a 1960s-vintage combat jet aircraft, although it would have become more complicated as various weapons and navigation systems were added to make the type capable of operating on the Egyptian Air Force's front line.***

LEFT ***The cockpit of the first prototype, now on display at the Deutsches Museum at Oberschleissheim near Munich. The cockpit of the diminutive fighter was "cosy", being approximately equivalent to the UK's Folland Gnat. The canopy hinged to starboard.***

Egypt. Messerschmitt approached Bhargava and shook his hand effusively.

During the early stages of the flight-test programme, Bhargava took the prototype to progressively higher speeds at low and medium altitude, resulting in increasing tailplane vibration issues at higher speed and altitude. Accordingly, the control surfaces were modified.

Enthusiasm for the project on a political level, however, was waning, despite the steady advances made during the ongoing development programme. The Egyptian leadership began to oppose the project, claiming, rightly, that costs were rocketing and that the aircraft would take too long to get into operational service. Hostility towards the HA-300 grew within the ranks of the EAF too, as Egyptian pilots wanted a fighter equal in quality (and quantity) to Israel's fearsome French-built Dassault Mirage IIIC.

SLOW PROGRESS

The HA-300 project continued, but with considerable less energy from the workforce and at a much slower pace. On July 22, 1965, the second prototype, HA-300-002, took off from Helwan on its maiden flight, but without the glamour and ceremony of the prototype's flight a year earlier. The following day, Bhargava performed a demonstration in the prototype for Nasser and his guests for that year's July 23 Revolution celebrations. The second prototype was also equipped with an Orpheus 703, which limited its performance to a maximum altitude of 12,000m (40,000ft) and a top speed of Mach 1·13 during a dive.

Development slowed further in 1965, and the HA-300 project narrowly avoided total collapse when a dispute broke out between the Egyptian government and Hassan Kamil, whom, it was alleged, was witholding $1·4m in salary advances to the staff he had contracted to work on the project. Kamil immediately resigned and ordered the withdrawal of 350 of the project's European workers within a month. Salary payments were stopped and the delivery of parts and materials from Europe, vital for the continuation of the project, were halted.

Brandner also tendered his resignation, which would have been the final nail in the coffin but for the offer of new contract, which was accepted by Brandner, and 146 of the 350 departing technicians were also persuaded to stay and given new contracts. Those who were not went back to Europe with tales of "Nasser's Folly".

It was becoming increasingly clear that Egypt had taken a classic path fraught with danger in aircraft development — building a brand-new aircraft, in this case a state-of-the-art supersonic fighter, to be powered by a brand-new untested engine of advanced design. To add to these troubles, this was to be achieved by a fledgling industry with zero experience, completely reliant on foreign expertise, materials and equipment.

Development of the E-300 engine had continued since the beginning of the programme and, finally, in July 1963, the powerplant was bench-run for the first time. Progress was extremely slow, however, and eight prototype engines underwent some 2,000hr of bench-running before the ninth was installed on the port wing of an Antonov An-12 for flight testing in June 1966. The April 1967 issue of *Flying Review*

International described Brandner's powerplant:

"The E-300 itself offers nothing revolutionary, being a relatively unsophisticated lightweight turbojet with a nine-stage compressor, annular combustion section and a two-stage turbine. Weighing 1,764lb (800kg), the E-300 is claimed to offer afterburner thrust of 10,580lb (4,800kg), which is to be boosted to 11,465lb (5,200kg), the afterburner apparently producing some 40 per cent thrust augmentation and being fully variable".

A second Indian test pilot, Wg Cdr Inder Mohan Chopra (**RIGHT**), was recruited for the test programme, and on May 24, 1967, the new pilot broke the sound barrier in the second prototype, reaching Mach 1·3 at 39,370ft (12,000m). In 1966 Bhargava flew to the UK with the EAF's chief test pilot, Lt-Col Zoheir Shalaby, to visit Yeovil-based Normalair, at whose factory a complete, fully-equipped HA-300 cockpit mock-up was undergoing ground tests of its pressure controls and cabin conditioning.



Bhargava was also called on to train Shalaby and Maj Sobhy El Tawil to become test pilots for the HA-300 programme. Bhargava later recalled:

"During testing El Tawil encountered flutter when a thruster on the port wing was fired. He followed the briefing exactly and did not allow aerodynamic loads to increase. Instead, he throttled back and gently eased out of the dive. He returned safely with a cracked inner hinge of the port elevon. The Germans were very impressed with his airmanship."

Sadly, Shalaby was killed on June 9, 1967, when his MiG-17 was shot down by an Israeli Mirage IIIC during the Six-Day War.

MORE INDO-EGYPTIAN COLLABORATION

India continued its collaboration with Egypt with the installation of an E-300 engine in the prototype of India's indigenous twin-engined HAL HF-24 Marut (Spirit Wind) supersonic single-seat fighter, designed by Messerschmitt's countryman, Prof Dr Dipl-Ing Kurt Tank. Referred to as the Mk I BX, this machine was used to test the E-300 during high-performance trials. The Marut, which had made its first flight on June 17, 1961, was a logical choice, as the prototypes were fitted with Orpheus 703s, as fitted to the HA-300 and approximately of the same dimensions as the E-300. As Bhargava later recalled:

"The Mk I BX was flight-tested in India with Orpheus engines, and again in Egypt after delivery and reassembly at Helwan. Shortly thereafter an E-300 was installed in the starboard engine bay. A team from HAL supported the flight-testing of this aircraft, despite the technical and logistical difficulties resulting from the distance between Bangalore [in India] and Helwan . . . well over 100 flights [were] performed and the E-300 [was] declared ready for installation in the HA-300. Apart from just over a dozen flights performed by me, all flight testing of the Mk I BX was undertaken by Chopra."

These achievements, however, were overshadowed by Egypt's defeat by Israel in the Six-Day War. Having lost many aircraft, tanks, soldiers, vehicles and other equipment in the conflict, Egypt quickly needed to recover and rebuild its military with cheap, readily available materiel. Enter the Soviet Union, which stepped into the breach to provide the Egyptians with Tupolev Tu-16 bombers and, more significantly for the HA-300 project, MiG-21 fighters.

The two HA-300 prototypes flew a cumulative total of 135 sorties without incident or accident, but in July 1967 Messerschmitt and his team were instructed to terminate all development work on the HA-300 project. It was to be his final aircraft design.

Efforts were made by the Egyptians to continue the HA-300 project and a third prototype, HA-300-003, was completed in 1969 with an E-300 engine. Bhargava performed a number of take-off runs but was forced to abort

BELOW ***The HAL HF-24 Marut was the first jet-powered fighter of Asian origin to be put into production and enter operational service. The attractive twin-engined interceptor and ground-attack aircraft was blighted, however, by problems with its Orpheus engines — hence the co-operative efforts with Egypt to fit the E-300 engine in the type.***

TAH ARCHIVE





HIGH CONTRAST VIA AUTHOR

ABOVE ***The first prototype HA-300 on display at the Deutsches Museum's Flugwerft at Oberschleissheim. After the cancellation of the HA-300 project, the Egyptians turned their attention from developing expensive indigenous aircraft designs to using regional political leverage to acquire state-of-the-art aircraft from the Soviet Union instead.***

these owing to problems with the fuel and oil mix of the E-300. Bhargava later recalled:

"Indian policymakers were quite confused about the collaboration with Egypt. According to the Indians, both countries would use the Marut fitted with the E-300 engine. The Indian authorities had not realised that the Egyptians were not interested in the Marut. When this became clear, official Indian enthusiasm for the E-300 disappeared. This sounded the death knell of the HA-300 project."

With little manpower left and even less official appetite for it, the HA-300 project was finally abandoned in June 1969. *Flight's* June 12, 1969, issue reported the following: "Cancellation by the Egyptians of the Helwan HA-300 reflects both the dependence of Egypt on Soviet arms supplies and also the pressure upon the Egyptian economy to pay for these".

Writing in *The Times*, Middle East specialist journalist Winston S. Churchill, grandson of the famous British wartime leader, wrote that even before the Six-Day War, the Soviets had made themselves indispensable to the Egyptians, explaining that "Egypt's agricultural and growing oil production has been mortgaged for years in advance to pay not only for Soviet arms but the development of [the HA-300] fighter and surface-to-surface missiles — none of which has progressed beyond prototype stage".

Flying Review International was equally damning in its analysis: "[The HA-300 represents] an interceptor unlikely to rival the MiG-21, which has been made freely available throughout a large proportion of the Arab world at a price with which the HA-300 will never be able to compete, and thus the export potential of this venture is strictly limited. The HA-300's configuration and size do not suggest a useful ground-attack potential [either]".

After nine years of staggering along as the potential centrepiece of Egypt's fledgling aircraft industry, the HA-300 project had reached the end of the road. All there was to show for it were three complete prototypes, only two of which had flown, neither with the intended powerplant; a handful of prototype examples of a small and comparatively unsophisticated turbojet; a large collection of partly-completed manufacturing and assembly shops — and an eye-watering bill.

RELICS OF AMBITION

Following the project's cancellation, the first prototype, HA-300-001, was put into store at Helwan, where it was largely forgotten. In 1991 Daimler-Benz Aerospace AG (DASA), recognising the link with its heritage through the involvement of Messerschmitt, purchased the aircraft, which was partly dismantled and flown aboard a Transall C.160 to Germany, where it was restored by Messerschmitt-Bölkow-Blohm (MBB) apprentices at Manching.

After five-and-a-half years and some 20,000 man-hours spent restoring the aircraft to virtually factory-fresh condition for static exhibition, it was handed over on March 26, 1997, with Bhargava in attendance, to the Deutsches Museum's Flugwerft Oberschleissheim, near Munich, where it remains on display today.

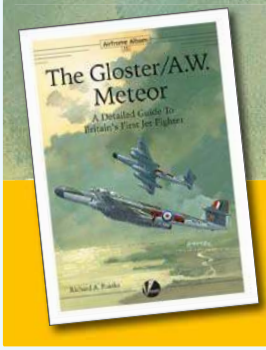
The second prototype is preserved at the Egyptian Air Force Museum in Cairo and the third remains at the Helwan factory.

"The best all-in-one books of a single type around..."

NEW – Out now!

The Gloster/A.W. Meteor

by Richard A. Franks



Valiant Wings' Airframe Album series appeals to aviation history and technical enthusiasts eager to get under the skin of an aircraft

A wealth of historical and modern photographs

Period detail images during production and service use

3D isometric views by Wojciech Sankowski

Colour profiles and camouflage detail by Richard J. Caruana

160+ information-packed pages that no World War II aviation enthusiast should be without

Order your copy today – only **£18.95!** plus p&p

www.valiant-wings.co.uk

+44 (0)1234 273434

valiant-wings@btconnect.com

VALIANT WINGS PUBLISHING

Aviation Book Centre

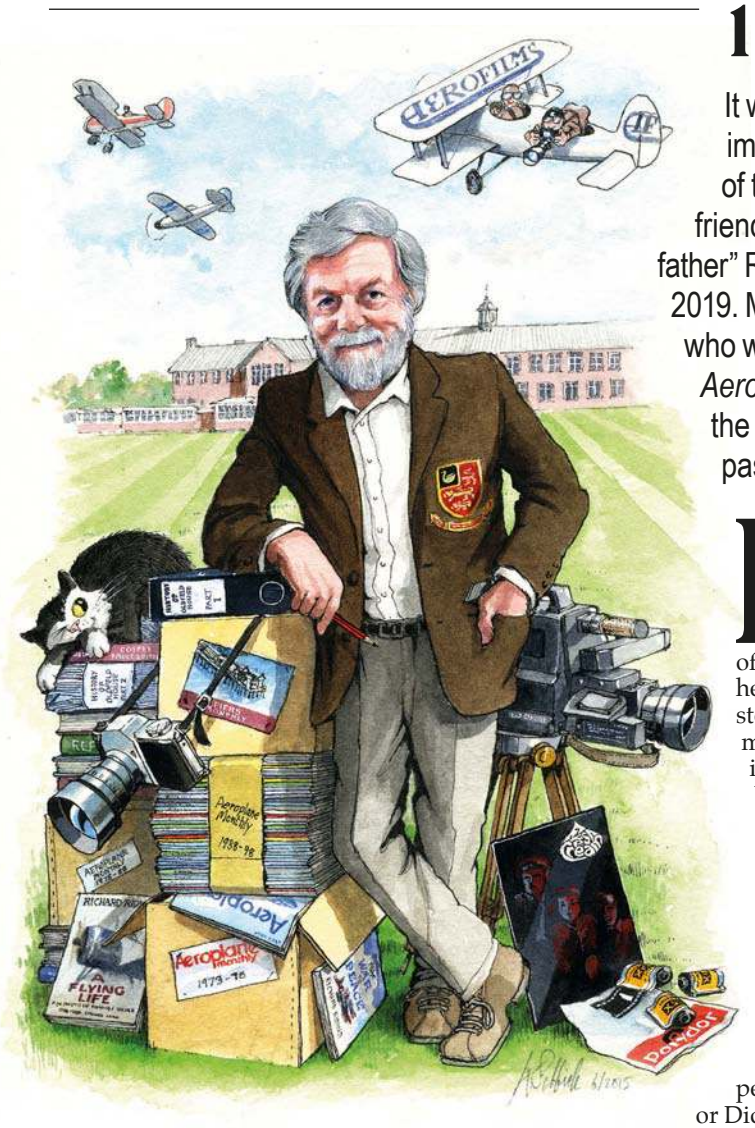
Specialist in aviation books with thousands of titles in stock

Over 10,000 items ready for immediate dispatch

www.aviationbookcentre.com

T: 01772 701301 E: sales@aviationbookcentre.com

Richard T. Riding
1942–2019



1942 Born March 25, at Hayes, Middlesex
1953–58 Educated at Swanage Grammar School
1958–62 Aerial photographer, Derby Aerosurveys
1962–71 Freelance photographer
1971–73 *Flight* editorial
1973–98 Founding Editor, *Aeroplane Monthly*
1989–91 Editor, *War in the Air*
1984–95 Editor, de Havilland Moth Club (deHMC) magazine *The Moth*
1992–2019 Freelance writer, Editor of National Piers Society magazine *Piers* and Swanage Grammar School Association magazine *The Swan*
2016–19 Director, deHMC

It was with profound shock and immense sadness that we heard of the death of former colleague, friend and *TAH's* "honorary grandfather" Richard T. Riding, on January 5, 2019. Managing Editor **MICK OAKEY**, who worked alongside Richard at *Aeroplane* for 15 years, celebrates the life of this complex but deeply passionate publishing pioneer . . .

HOW TO SUM up Richard T. Riding? It's far from an easy task — and I worked as his right-hand man for 15 years, so I had plenty of time to fail to figure him out. But here goes, a first-paragraph-of-the-story summary: he was a mercurial maverick who brought his diverse interests, talents and experiences to bear on aviation-history journalism, and did so with great humanity and absurdist humour. He was cultured and "proper", but also a fountain of scatological jokes. He could be the life and soul of the party, and equally he could be withdrawn and reclusive. Above all, he was unquestionably life-enhancing.

This is going to be a very personal perspective on Richard — or Dicky, as so many friends and family called him — from the angle of a long-time close colleague, so I must apologise in advance if I omit any aspects of his life. I only ever called him Richard to his face (as he was my boss), but often referred to him as "Uncle Dicky" behind his back (he wasn't my uncle, but, as many people will attest, he could be most avuncular).

Making a true believer

Born on March 25, 1942, Richard Trevor Riding had aviation — and journalism, and photography — coursing through his veins from the start. His father, E.J. "Eddie" Riding, was



LEFT ***With model monoplane in hand, the seven-year-old Richard displays characteristic glee in this photograph taken, probably by his father Eddie, at the family home at Hendon during the Christmas of 1949. Although the establishment of the RAF Museum at Hendon was still several decades off, the aerodrome remained in use as an RAF station until late 1957.***

RICHARD T. RIDING COLLECTION

OPPOSITE PAGE ***A wonderfully affectionate portrait of "Arty Ar" (as he often signed off correspondence) painted by KEITH SIBBICK in 2015. Commissioned by the Swanage Grammar School Association, it ingeniously brings together most of the various passions Richard pursued throughout his life, including aviation, photography and local history.***

© 2019 KEITH SIBBICK VIA SWANAGE GRAMMAR SCHOOL ASSOCIATION

an aircraft engineer more widely known as an aeromodeller, photographer, and draughtsman of scale drawings for *Aero Modeller* magazine and the Harleyford/Harborough series of books, including the multi-volume *Aircraft of the Fighting Powers*, published throughout World War Two. Eddie had begun photographing aircraft when aged 15, in 1932, and in the absence of easily obtainable colour film at the time he presciently included colour-scheme details in his notes, alongside dates and locations.

Thus Richard had a powerful role-model in his father, and spent his early years in close proximity to aircraft: he was born at Hayes, Middlesex, a stone's throw from what is now Heathrow Airport, where Eddie worked as an Aeronautical Inspection Directorate (AID) inspector, attached to the Fairey Aviation Co. Before Richard's first birthday the family moved to Hendon, where the RAF station (and former pioneering pre-World War One aerodrome) was a mere street or two away, and the frequent sound of aero-engines would promise a sighting of something interesting in the sky.

It wasn't just conventional aeroplanes, though. One of Richard's earliest memories was of V1 attacks on London in the summer of 1944. While everyone else's first instinct was to sprint for the air-raid shelters, Richard would toddle into the garden — doubtless giving his mother Marjorie a heart attack in the process — in the hope of spotting one of the flying-bombs overhead, shouting with glee, "Look, here comes another ruddy Doodlebug!".

Meanwhile Eddie had been posted from Fairey to Leavesden, working first at London Aircraft Production and then at de Havilland. The access afforded by Eddie's job meant that Richard got to watch Mosquito engine-runs at close quarters — a powerful influence on the young enthusiast.

Another formative time for Richard began in early 1946, when Eddie left the AID and went to work for D.A. Russell (owner of *Aero Modeller* and Harleyford Publications) at his fabled aeromodelling Mecca, the Model Sportsdrome at Eaton Bray, Bedfordshire, which was about to open. "Naturally there were model aircraft all over the place", recalled Richard years later, "and my dad's office was a real glory hole, with photographs, books, magazines and large drawings all over the place. I used to spend time in the darkroom with dad and this sparked off a lifelong interest in photography". Eddie continued to create fine scale-drawings, model plans and photographs; all-in-all setting new standards of accuracy and detail in aeromodelling journalism — standards that his son would seek to emulate in his own photographic and aviation-magazine career when he grew up.

Early tragedy

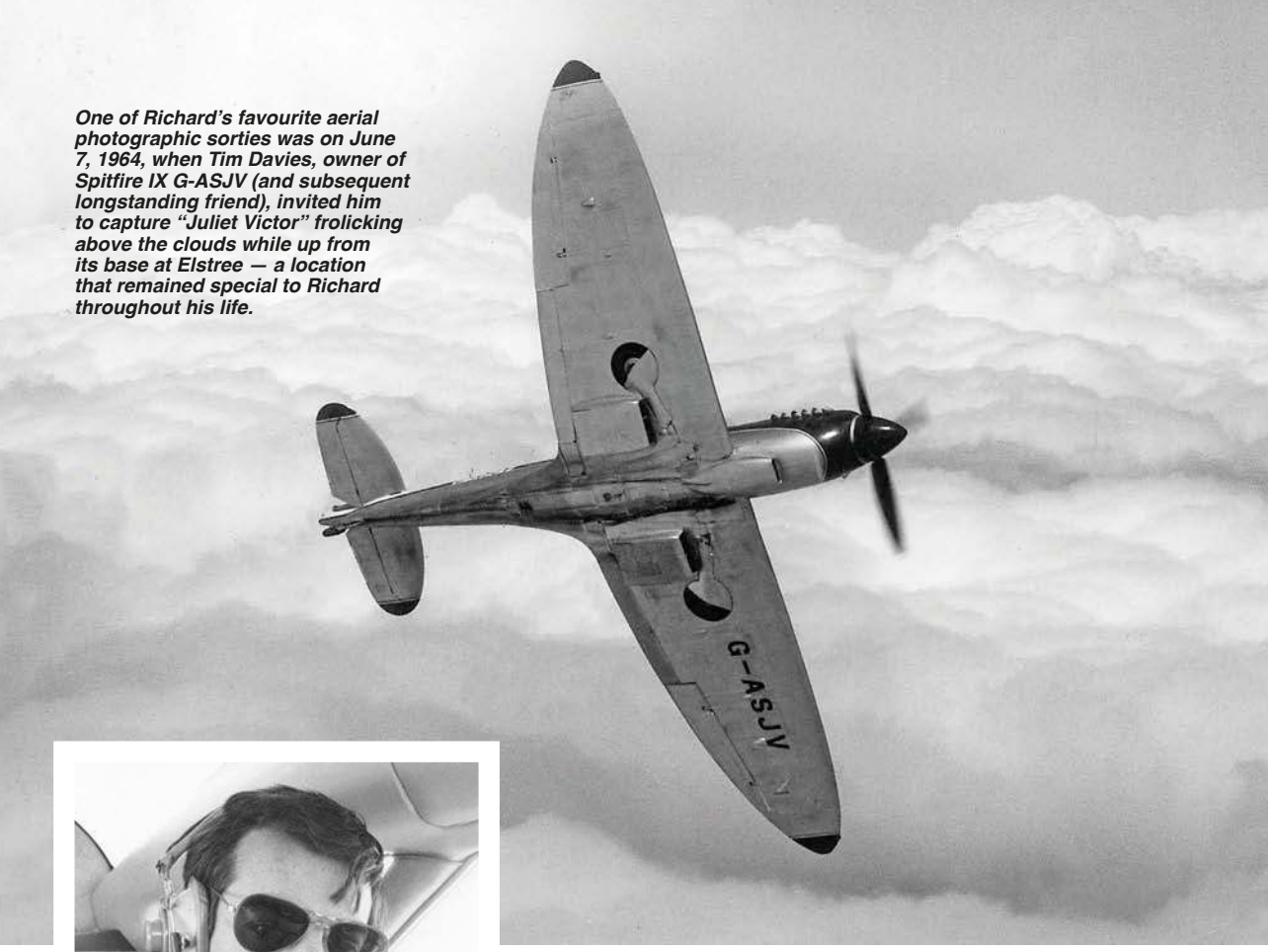
Before all that could happen, though, Richard's life changed forever — just a fortnight after his eighth birthday.

On Good Friday, April 7, 1950, Eddie Riding died in the crash of Auster J/5B Autocar G-AJYM at Boston in Lincolnshire, where he had gone to report on the opening of the local flying club. Artist Stanley Orton Bradshaw was piloting 'YM, and was demonstrating the aircraft's slow-flying capabilities when it dropped a wing, entering a spin. Bradshaw took recovery action but it was too late, and the aircraft hit a high bank bordering the airfield, killing the occupants instantly. Eddie was just 34 years old.

Unsurprisingly, Richard used to describe the Autocar as his "least favourite aircraft type".

Despite this tragic blow, Richard remained in the grip of the aviation bug, immersed in his father's collection of books and photographs. Marion, one of Richard's two sisters, recalls him

One of Richard's favourite aerial photographic sorties was on June 7, 1964, when Tim Davies, owner of Spitfire IX G-ASJV (and subsequent longstanding friend), invited him to capture "Juliet Victor" frolicking above the clouds while up from its base at Elstree — a location that remained special to Richard throughout his life.



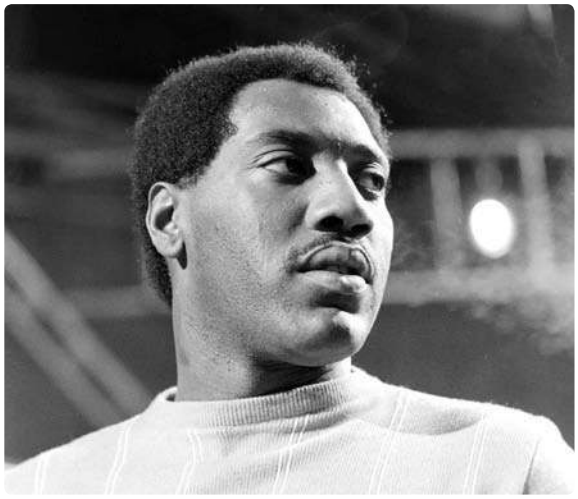


RICHARD T. RIDING COLLECTION x 3

ABOVE ***A portrait of Richard taken aboard camera aircraft Beagle Airedale G-ASAH during a photo sortie circa 1965. Richard later recalled of the Spitfire sortie: "It took the Spitfire seconds to reach our height, while our Tri-Pacer took most of the day. Tim took some minutes to find the Tri-Pacer, which he initially mistook for a fly on the Spitfire's windscreen . . ."***



RIGHT ***A classic example of Richard's eye for a photograph that tells a story — a Russian gentleman lends a sense of sheer scale to the behemothic ocean-going-liner-like prototype Mil V-12, the largest helicopter ever built, which Richard photographed on its public debut at the Paris Air Show in May–June 1971.***





RICHARD T. RIDING COLLECTION

ABOVE LEFT ***Richard's much-syndicated — and little-credited — portrait of soul legend Otis Redding during a visit to the UK in 1967.*** **ABOVE RIGHT** ***In late 1966 Richard was commissioned to photograph Ginger Baker, Jack Bruce and Eric Clapton for the cover of Cream's first studio album,*** **Fresh Cream.** ***Goggles photographer's own.***

trying (fruitlessly) to get her to memorise aircraft types when she was only four years old, using a pile of *Aero Modeller* issues as a teaching aid.

Richard went to board at Swanage Grammar School in Dorset, which engendered in him a great love of the countryside, of Dorset itself and of its most famous writer, Thomas Hardy. It also instilled in him a quiet everyday discipline about such things as tucking one's chair under the table after meals. As he once said in a letter to the *Daily Telegraph*, he and his fellow students "were also encouraged never to scrape chairs when rising from the table, slam doors, leave windows unlatched, lights on in an unoccupied room, or water running. Such 'sins' resulted in the loss of an hour's freedom on Saturday afternoons". Looking back, this might explain Richard's perpetual despair at the state of my desk when we worked together on *Aeroplane* . . .

On leaving school with only vague ideas about his future career (his lack of enthusiasm for maths or science rather ruled out any thought of following his late father into the aero-engineering industry), he landed himself a summer job in 1958 with Simpson Aeroservices at Elstree Aerodrome, where he learned how to dope repair patches on to fabric-covered light aircraft, among other maintenance skills.

To Derby (Aerosurveys) . . .

When that job ended in the autumn, Richard made the long trek all the way across the hangar to join Derby Aerosurveys (DA), which took him on for a princely £1 15s a week as a photographic darkroom technician. Having suddenly found his *métier*, Richard didn't remain stuck in the darkroom for long, cajoling his employer to let him try his hand at aerial photography. Thus it was that, on the evening of April 10, 1959, Richard climbed aboard one of the company's Austers, J/1N Alpha G-AGTP (his pilot was *TAH* author Ed Wild; see page 129 in this issue); and in a mere 10min during the 30min flight he exposed a roll of film, the resulting prints from which he placed on his boss's desk at 0800hr the next day. The boss liked what he saw.

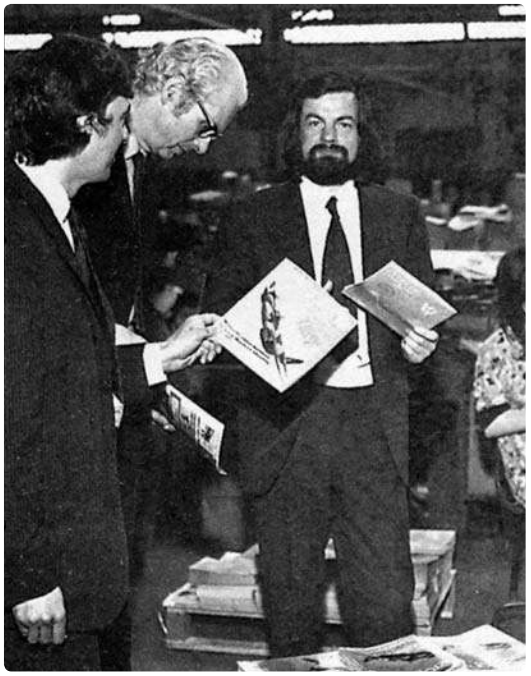
Three months later DA's main photographer left to join another firm, and Richard replaced him, receiving a whopping £2-a-week pay rise — as he would, on top of the camera work, still be doing all the developing and printing. By the end of nearly four years with DA, Richard was on £7 15s a week; at which point the company promptly went bust, in 1962.

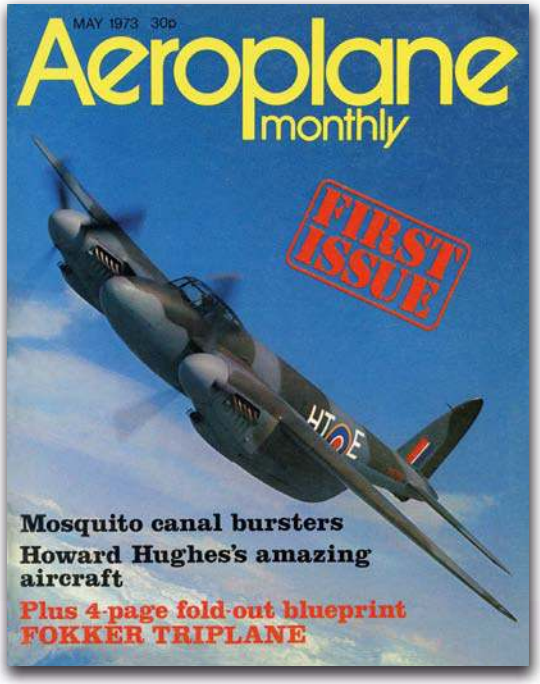
Richard went freelance, and during the following nine years he expanded his repertoire to include studio photography — the latter often for Polydor and Atlantic Records. This was the Swinging Sixties, and Richard frequented Chelsea, photographing pop/rock music luminaries including Jimi Hendrix, Cream, Otis Redding and the Bee Gees (a book of his photographs from this time is in preparation). He also met and befriended Spike Milligan, having previously sent the legendary surrealist comedian some photographs of himself (Richard) in a toga. Wearing a crash-helmet. Standing in a dustbin. Holding an umbrella.

Rather than notify the police, Spike sent an encouraging reply. Richard subsequently got to know him while photographing him for ad campaigns and TV programmes, and was also a great friend of Spike's daughter Jane.

Taking *Flight*

Aviation never lost its hold over Richard, though, and in 1970 he wrote to J.M. "Mike" Ramsden, Editor of the weekly *Flight International* magazine, seeking employment. No posts were available at the time, but the next





ABOVE ***A proud day indeed — Richard inspects the first issue of*** **Aeroplane Monthly (ABOVE RIGHT),** ***hot off the press at Index Printers in April 1973. The new magazine was innovative, presenting a mix of in-depth historical articles and news from the world of restorers, rebuilders and replica-makers of historic aircraft all over the globe.***

year Richard was invited to be interviewed for the role of layout artist — cutting-up and pasting text and images into the desired arrangement in preparation for printing. "During the interview *Flight's* Editor was impressed with his ignorance of everything to do with journalism, particularly with magazine layout," wrote the late Steve Piercey in an article in Autumn 1983's *Propline*r magazine, "and things did not look good". But then Richard happened to mention to Mike — a former de Havilland Aeronautical Technical School apprentice — that de Havilland aeroplanes brought him out in goosebumps. Suddenly the job was his. Thus he went to work at *Flight's* London HQ at Dorset House, in Stamford Street, Southwark.

Eighteen months of weekly deadlines gave Richard a good grounding in magazine production, as well as a probable addiction to the fumes of Cow Gum: it sounds like an animal glue, but it was actually a highly aromatic (and probably toxic) petrol-based rubber solution, invented by a Mr Cow and used for paste-up page layouts by all of us who worked on magazines before the adoption of desktop computer publishing in the 1990s. In the middle of the day, though, Richard would escape the editorial-office buzz and the reek of petrol enveloping his desk, and travel back in time. "I used to spend my lunch hours in the building's dank, barely-lit basement", he wrote in 1998, "sifting through the glass-plate negative collection of *Flight's* weekly contemporary *The Aeroplane*. This illustrious journal, started by C.G. Grey in 1911, closed in 1968 and was absorbed into *Flight*".

What began as a lunchtime hobby quickly developed into something far more ambitious. The negs were at the mercy of fluctuating temperatures and humidity, as well as leaks and worse. "It seemed criminal to me that such a priceless collection should be allowed to deteriorate in such fashion," said Richard, "and I vowed that I would do something about it. Perhaps, I thought, it could become the basis for a series of books or, better still, a magazine — yes, a magazine seemed the better bet".

Aeroplane flies!

Thus, in late 1972, Richard presented the concept for *Aeroplane Monthly* (we finally dropped the "Monthly" from the logo in 1998) to *Flight's* publisher, former wartime RAF Pathfinder Wg Cdr Maurice Smith DFC. The idea was to resurrect the old weekly *The Aeroplane* as an historical monthly for enthusiasts, utilising its archive as well as that of *Flight*.

"Within a very short space of time the company, then IPC Business Press, gave the green light", Richard recalled, "and I was summoned to Maurice Smith's office to discuss details. Who, I was asked, did I think should be Editor? There was no question of that. The magazine was my idea, I knew exactly what I wanted and *I* wanted to be Editor, and I told him so. Maurice accepted this without question and in February 1973 *Aeroplane Monthly* was cleared for take-off".



> **“Richard steered the magazine’s development from the era when its text was typeset in hot metal, working from typescript copy sub-edited by hand — and when one had to wait six weeks for proofs of colour pages to come back from the repro house — to the computer era, when pages were laid-out on-screen”**

ABOVE ***To mark Richard’s retirement from the* Aeroplane *Editor’s chair in March 1998, the editorial team presented him with a Frank Munger painting of his favourite Comper Swift, Alban Ali’s VT-ADO (now G-ACTF). From left to right:* Aeroplane’s *Secretary Lydia Matharu; Mike Hooks, editorial assistant; RTR; the author and Philip Jarrett.***

It was as simple as that — and a very different world from the market-research “focus groups” and endless managerial teeth-sucking of later years whenever anything new was proposed.

Richard recruited Philip Jarrett from the Royal Aeronautical Society as Assistant Editor; a wise move, as Phil was already carving out a reputation as an outstanding historian. Phil remained in the post for eight years before moving down the corridor to join *Flight*, although he continued to compile *Aeroplane’s* aircraft-preservation newspages for a further three years, and to contribute articles and provide editorial support for many years thereafter. Today he is a valued member of *TAH’s* Editorial Board and regular *TAH* author.

So, in the third week of April 1973, the very first issue of *Aeroplane Monthly* went on sale, priced 30p, following an official launch at the Pathfinder Club in Mayfair, across the Thames from the editorial office. “Right from the start the magazine was a runaway success,” Richard proudly recalled upon his retirement from the Editor’s chair in 1998, after a remarkable 25 years at the helm. That first issue contained 60 pages, and over the decades it grew in both format and pagination until occasional special issues were more than double the size, at 124 pages. Richard steered the magazine’s development from the era when its text was typeset in hot metal, working from typescript copy sub-edited by hand — and when one had to wait six weeks for proofs of colour pages to come back from the repro house — to the computer era, when pages were laid-out on-screen (admittedly not by Richard himself, who took some years to warm to the idea of computerisation). Originally *Aeroplane* contained two four-page sections of colour, everything else bar the covers being black-and-white; by the time Richard retired, full colour was sprinkled throughout the magazine.

Some things did not change, though. The front cover was always an air-to-air colour photograph, and Richard did not like to delegate the look of the magazine’s pages to others. “I have insisted on personally selecting all the 37,000 photographs and illustrations and laying out most of the 21,000 pages published to date”, he said at the end of his time as Editor. As he had told Maurice Smith in 1973, he knew exactly what he wanted.

Another thing that never changed was *Aeroplane’s* spirit and ethos. Because the magazine was built upon two great archives, there was always a sense of its heritage, its title being chosen to “perpetuate the name of a much-respected forerunner”, as Richard put it. This link proved canny, because so many aviation people had grown up with the weekly *The Aeroplane*. It meant they felt they already knew the magazine when it reappeared in monthly form and were well-disposed towards it, so it was immediately accepted into the mainstream and attracted renowned authors including famous pilots such as Roland Beamont and Alex Henshaw, and technical specialists such as Bill



RICHARD TRANFIELD

ABOVE ***Richard in typically thoughtful pose (or eyeing the pet cat with suspicion!) in the gardens at his home at Batlers Green House in Radlett, Hertfordshire, in 2017. A visit to the house invariably involved a drive to a nearby hostelry for what he called a "fried holocaust", followed by an afternoon of remotely controlled helicopter flying.***

Gunston (see our tribute in *TAH5*). The magazine also revelled in exploring more obscure parts of history — the very first feature in the first issue was about the Parnall Peto submarine-borne (yes!) reconnaissance biplane. And, certainly not least, *Aeroplane* reflected its creator's own character, demonstrating how excellent, accurate aviation history does not have to be po-faced and humourless.

A legacy of quality

Exactly two-fifths of the way through Richard's tenure as *Aeroplane's* Editor, he acquired me as his assistant, fresh from my previous job as a (very) junior curator at the RAF Museum at Hendon, in May 1983. I had met him only once before, when I went for my job interview earlier that year. I had come out thinking he had almost seemed to be handing me the job on a plate; I then spent several weeks fretting as I heard nothing back. In the end I could stand the suspense no longer, so I picked up the phone and called him. "You've got the job!" he said. "Can you start next week?" Lesson One: production of the next issue takes precedence over pretty much everything else, including phonecalls and letters.

Richard taught me a great deal about magazine journalism; but subtly, often without me realising I was being tutored. He also taught me a great lesson in management: if you reckon the people working for you have the necessary ability, don't hover over them, just give them maximum freedom to get on with the job. Admittedly sometimes Richard was a bit too hands-off, disappearing from the office for days or occasionally weeks at a time; but whenever I got stuck I could trot along the corridor to *Flight* and seek advice from Phil Jarrett.

Richard's own advice was usually understated. If he saw me getting too bogged-down in small detail he would say "you're making heavy weather of that"; and if he felt I had designed a feature headline with too bright a colour or too large a type size (i.e. to him anything over 36pt), he would pronounce it "a bit sudden".

Before I joined *Aeroplane* I had assumed it was produced by an editorial army, with the Editor presiding over a roomful of desks at which green-celluloid-eyeshade-wearing staffers bashed away at banks of typewriters. When I actually arrived I quickly discovered it was just Richard, a secretary and me — which only made the process of creating a monthly magazine an even more wondrous miracle.

Once a month Richard and I would decamp to our printers in Dunstable, Bedfordshire, to "put the issue to bed". This mainly entailed a morning in the room set aside for us, reading and signing-off final page-proofs or revising them where necessary. We would then sprint the length of the printers' car-park (I always let Richard win — he was the boss, after all) and Richard would drive us to Dunstable's curious and now long-gone galleon-shaped Windsock pub/restaurant, where he would usually polish off half a pound of hamburgers plus chips for lunch. Then we would head up on to Dunstable Downs, where, overlooking the London Gliding Club's airfield, we would spend the afternoon flying Richard's radio-controlled model gliders.

As Editor of *Aeroplane*, Richard never seemed to be in a hurry. He made it all look effortless, in a way I never managed either as his assistant

or his successor. He would delight in spending hours in the office cleaning glass negatives with Brasso metal polish, or sticking labels on manila folders of photographic prints with Cow Gum (which meant they fell off a few months later and had to be re-stuck); or painstakingly Letrasetting feature headings instead of just telling the typesetters "30pt Franklin Bold Condensed". But we never pressed late — well, not by more than a day or so, anyway.

When on a high, Richard could render everyone in his vicinity helpless with laughter. He once arrived at work dressed as Superman, and once as a German officer. He had a way of constricting his vocal chords which enabled him to do an extraordinarily convincing impression of a small boy, known to all as Jeremy, which provided endless possibilities for prank phone-calls. He had his low times and flashes of anger, too, once hurling a typewriter out of an upper-floor office window to smash into smithereens on the pavement of Stamford Street below. If he was in a bad mood, it was rather like sharing the office with a thundercloud.

Charisma and mischief

Although Richard did not marry, he had a succession of girlfriends, some very long-term, and was a powerfully charismatic ladies' man. At heart, though, in many ways he preserved the innocence and mischievous playfulness of that eight-year-old boy who was blissfully unaware that he was about to lose his dad in traumatic circumstances. Whereas the Auster Autocrat was Richard's least favourite aircraft type, his most favourite by far was the diminutive Comper Swift (rather appositely, he was writing a book about the compellingly eccentric Nick Comper and his aircraft company when he died). He loved the Swift for many reasons, but partly because it fell into the category of what he called "Rupert Bear aeroplanes": small, simple, chubby, open-cockpit monoplanes.

Richard loved to fly, especially with friends; although, as an aviation journalist, he was offered far more opportunities than could be taken up between office deadlines. Hence it was that, by accident rather than design, Richard did not fly in an open-cockpit aeroplane until August 3, 1984, when he had a trip in Derek Ellis's Morane-Saulnier-built de Havilland D.H.60M Moth, G-AANV. Before the flight, he recalled, "Whilst chatting in the hangar I let it slip that I had never flown in an open-cockpit aeroplane. There was a stunned silence during which you could hear dope drying".

By this time Richard was also editing the de Havilland Moth Club's magazine in his spare time. In 1989 we launched *War in the Air* as a monthly offshoot of *Aeroplane*, comprising facsimile reprints of articles from *Flight* and *The Aeroplane* from 50 years earlier, with a tailpiece historical-perspective column provided by Bill Gunston. Sadly it was axed after less than two years, just as it was turning a profit; the victim of a restructure of part of the company.

A passion for piers, piano and painting

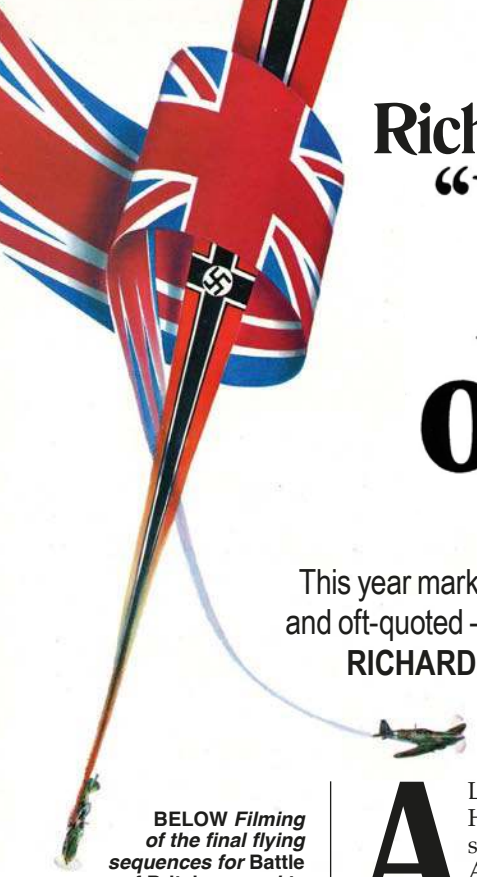
Richard had many interests outside aviation, one of his passions being for seaside piers. From 1992 he was in his spare time Editor of the National Piers Society's magazine, and co-wrote books on the subject. He also edited the Swanage Grammar School Association's magazine for many years; was a lover of classical and jazz music, and a fine pianist; a committee member of the St Albans branch of NADFAS (the National Association of Decorative & Fine Arts Societies), near his long-time home in Radlett; an accomplished watercolour painter, and last year was Honorary Vice-President of the Guild of Aviation Artists.

In one article Richard wrote for *Aeroplane* in the 1980s, he used the word "exhuberating". This made me twitchy while I was sub-editing the piece for publication, because it's not really a word; and so, with the rigid certainty of youth, I struck it out or changed it, and Richard did not demur. But now, looking back, I can see it is actually a fine portmanteau term which sums up Richard's presence, whenever he was at his best, to a tee: a combination of exhilarating and exuberant. Richard Riding left the world a cheerier, culturally richer, better-informed and more entertained place than when he arrived in it. Few of us could wish for a better epitaph.

Richard Trevor Riding, March 25, 1942–January 5, 2019

Publications

de Havilland: the Golden Years 1919–1939 (IPC Business Press, 1981); *The Red Arrows* (IPC Business Press, 1982); *Ultralights: The Early British Classics* (Patrick Stephens, 1987); *Elstree Aerodrome: The Past in Pictures* (with Grant Peerless, The History Press, 2003); *A Guide to Collecting Seaside Pier Postcards* (with Martin Easdown, The National Piers Society, 2006); *British Seaside Piers* (with Chris Mawson, Ian Allan, 2008); *Leavesden Aerodrome: From Halifaxes to Hogwarts* (with Grant Peerless, Amberley Publishing, 2011); *A Flying Life: An Enthusiast's Photographic Record of British Aviation in the 1930s* (Fonthill Media, 2015); *From War to Peace: a Photographer's View of British Aviation During the 1940s* (Fonthill Media, 2015); plus hundreds of magazine articles



Richard Riding's "Battle of Britain" photo gallery

This year marks the 50th anniversary of the premiere of the much-loved and oft-quoted — if slightly creaky — *Battle of Britain* film. When he died, **RICHARD T. RIDING** was working on an article for *TAH* based on a superb series of photographs he took at Bovingdon in 1968 — a few of which we present here as a tribute

BELOW ***Filming of the final flying sequences for* Battle of Britain *moved to Bovingdon when the production company's arrangement to use Duxford as its main flying base came to an end in late September 1968. Spitfire Mk IA AR213/G-AIST is seen here as "N3311/AI-B", one of several spurious identities it wore during the making of the film.***

ALONG WITH ELSTREE and Leavesden, Bovingdon airfield in Hertfordshire had long been a favourite haunt of Richard's when some of the vintage hardware being used for the filming of United Artists' wartime classic, *Battle of Britain*, was moved to the former USAAF base from Duxford in September 1968. Then working as a freelance photographer, snapping everything from Jimi Hendrix to VC10s taking off ("Hendrix was louder"), Richard hustled along to Bovingdon to take a magnificent series of photographs — many in colour — of the various Spitfires, Hurricanes and Spanish-built Heinkel He 111s and Messerschmitts gathered to recreate the epic battle in 1940. When he died in January 2019, Richard was working up an article based on the photographs and his recollections of the day; sadly it was not completed, but we pay tribute to his superb work with a selection of photographs — most of them previously unpublished — from one of Richard's finest hours. **NICK STROUD**





To provide a convincing Luftwaffe bomber force for the film, the **Ejército del Aire** *(Spanish Air Force) made its entire complement of 32 CASA 2.111s (essentially Rolls-Royce Merlin-powered Heinkel He 111s licence-built in Spain) available. Two examples were bought by the production company, Spitfire Productions, and flown to the UK, where they were registered G-AWHA and 'WHB. Both are seen here at Bovingdon during filming.*

BELOW *Another example of Richard's flair for dramatic composition, this glorious photograph of one of the two Spitfire Productions-owned CASA 2.111s highlights the deep intakes of the Merlin 500 engines, the smoke pots fitted to the exhaust stubs to create the impression of being on fire after an attack by one of "the Few", and the type's distinctive glazed nose section.*

Tracing exactly which Spitfire is which presents a challenge, as all examples used in the film, both static and airworthy, were painted with a finite set of spurious identities applied to most of the aircraft at different times. With a four-bladed propeller, six tubular exhaust stubs, four-aperture wheel-hubs and a small dipole aerial fitted to the underside of the rear fuselage, this is almost certainly Spitfire IX MH434 painted as "N3314/AI-E".



LEFT *John "Tubby" Simpson of Simpsons Aeroservices Ltd, responsible for keeping the show airborne in terms of maintenance, poses for Richard's camera beside Canadian-built Hurricane XII G-AWLW, one of only three airworthy Hurricanes available for filming. Sadly, it was destroyed in a museum fire in Canada in 1993.*

BELOW *Whose side are you on? Nearest the camera are three of the Hispano HA-1112 Buchóns — essentially Merlin-powered Messerschmitt Bf 109s built under licence in Spain — used for filming, alongside a pair of Spitfires. The Buchóns carry RAF camouflage and markings (note the underwing roundel on the nearest) as these three were used to make up the numbers during the memorable Polish Hurricane squadron training sequence.*



Another spectacular colour photograph of one of the two CASA 2.111s acquired by the production company, taken as its starboard Merlin coughs into life. Both G-AWHA and 'WHB were painted in 1940-standard two-tone green splinter camouflage on the upper surfaces with pale blue undersides, as were all the bombers used in the film. Both also wore various codes, including 6J+PR, as seen here, so it is difficult to say with certainty which of the two this is!





LEFT *Richard captured the purposeful essence of the Spitfire — even when on the ground — with this picture of Mk VC AR501 masquerading as "N3317/DO-H", complete with Squadron Leader's pennant beneath the windscreen.*

BELOW *Painted as "Red 4" for the filming, Buchón C4K-105/G-AWHH is seen here on the ramp at Bovingdon in October 1968. After more than four decades in the USA, G-AWHH returned to the UK in 2017 and is once again airworthy.*





THE LONGEST HOP

Part one: the Catalina years

Qantas & the Indian Ocean service, 1943-46

Australian aviation historian **BOB LIVINGSTONE** opens his two-part account of Qantas' extraordinary wartime non-stop air service over the vast expanse of the Indian Ocean, operated to connect Australia with Ceylon and ultimately India, thus re-establishing vital air links with the UK. Enter a tiny fleet of dangerously overloaded Catalina flying-boats . . .

THE REMARKABLE non-stop wartime air service operated by Qantas Empire Airways (QEA)[1] across the Indian Ocean began rather ignominiously. Although the average flight time over the Ceylon (now Sri Lanka)—Perth route was some 27hr, the aborted first service in July 1943 lasted only 7¼hr; the navigator realised three hours out that the two vital sextants had been left behind in the base safe, forcing a return to Koggala Lake on the south-eastern tip of Ceylon. It did not depart again for three days.

EARLY DAYS

The air connection between the UK and Australia, the Empire Air Mail Service (EAMS), had begun with First Class mail in 1934, and all-mail flying-boat operations began on July 28, 1938, with an Imperial Airways Short S.23 C-Class Empire flying-boat departing Southampton for Singapore, and a QEA S.23 departing westbound for the same destination from Sydney. British crews were responsible for all flights west of Singapore, Australians east of Singapore, while passengers remained on the same aircraft throughout.

Although war was declared by Britain on Germany in September 1939, it was not until Italy joined with Germany in June 1940, closing the Mediterranean sector, that the existing Empire Air Route was cut. Forming the first part of what would become known as "the Horseshoe Route", the connection between the UK and Durban in South Africa, initially by ship, was now from Poole in Dorset to Lisbon in Portugal, before following the West African coast to Libreville in French Equatorial Africa (now Gabon); then roughly along the Equator to Lake Victoria in Uganda, thence to Mombasa on the Kenyan coast and down the East African coast to Durban.

The route then turned north again to Cairo in Egypt (with interruptions in mid-1941 owing to the North African campaigns and the Iraq uprising), then to Karachi in India, Singapore and Sydney. Until October 1941 crewing remained as before until QEA continued on to Karachi with a three-day extension, to provide some relief for the hard-worked BOAC crews whose numbers had been depleted by the war situation.[2] This made a full seven days of flying (crews normally "slipped" a service in Singapore), and QEA had

to ask the Royal Australian Air Force (RAAF) to release some of the company pilots who had been transferred to the Service earlier in the war.

The entry of Japan into the war in December 1941 created further route changes as the Japanese advanced. Singapore was bypassed and operated as a branch service from Batavia in the Dutch East Indies (now Jakarta in Indonesia) from January 6, 1942, and the route was finally cut altogether after a QEA Empire flying-boat made the last Singapore—Batavia—Darwin departure in the early hours of February 4 that year. This was after IAL Empire flying-boat G-AEUH, named *Corio*, had been shot down with a QEA crew by Japanese Mitsubishi Zeroes just short of Koepang (now Kupang) on West Timor while attempting an evacuation flight from Darwin on January 30.

By March 1942, after Japanese bombing of both Darwin and Broome, all civil flying between Australia and the rest of the world, apart from the trans-Tasman service, was suspended, and Australian airlines and aircraft were absorbed into the business of defending Australia.

AUSTRALIA'S ISOLATION

An indication of the isolation of Australia at this point can be gauged by the fact that the vastness of the Pacific Ocean had deterred everyone from establishing a USA—Australia route since Sir Charles Kingsford Smith had made the first crossing in 1928 and the first eastward Pacific crossing by air in 1934. Attempts by Pan American to extend its USA—Hong Kong route to Australia via New Zealand using Boeing 314 Clippers and other flying-boats were initially frustrated by the loss of a Sikorsky S-42 and a lack of co-operation from the American government.

Australia was only temporarily linked to the USA across the Pacific in 1941 by the Tasman Empire Airways Ltd (TEAL) trans-Tasman service connection with the Pan Am Clipper in Auckland, New Zealand; and when QEA was given a taste for long-range flying-boat operations by ferrying the first 18 RAAF Consolidated Catalinas from San Diego, California, to Sydney, discovering that, with careful power management, it was possible to fly the 3,137 miles (5,050km) from Canton Island in the South Pacific to Sydney non-stop.[3]

The USAAF presence in the southern Pacific had begun with the intention of reinforcing the Philippines with Boeing B-17s and repossessed British-contract Consolidated Liberator IIs[4] of the

OPPOSITE PAGE ***A detail from the certificate awarded to those travelling on what came to be known as the "Double Sunrise" service between Perth and Ceylon, who experienced two sunrises on each flight. The text reads: "This is to certify that (name) has spent more than 24 hours continuously in the air on a regular air service, thus entitling him to membership of the rare and Secret Order of the Double Sunrise".*** VIA AUTHOR

BELOW ***Consolidated Catalina IB FP244 (c/n 831) was one of a batch of 225 delivered between July 1942 and February 1943. Never allocated to an RAF squadron, it went to BOAC on October 27, 1942, with the British civil registration G-AGFM. It is seen here at Koggala Lake on the southern tip of Ceylon.*** VIA AUTHOR





ERNIE CROME

ABOVE ***Consolidated Model 28-3 NC777, named* Guba *(actually* Guba II*), at Rose Bay, Sydney, before its epic flight from Western Australia across the Indian Ocean to Kenya in June 1939. The flying-boat, which later served with BOAC as G-AGBJ* Guba*, then flew on to the USA to complete the first circumnavigation of the globe by seaplane.***

7th and 19th Bomb Groups (BGs) under *Project X*, which departed the USA on December 20, 1941. The rapid speed of the Japanese advance, however, caused the route to be changed via South America, across the South Atlantic to Africa, then on to India. Too late by then to help the Philippines, the bombers were diverted to Java in the Dutch East Indies. A further eight aircraft departed the USA in January 1942, using a new southern Pacific route around Japanese-held areas, for Australia and north to Java. The remnants of this force were ultimately evacuated to Australia in early March 1942.

In April 1942 Consairway, Consolidated's USAAF Air Transport Command-contracted civil airline, began a transpacific service to Australia with LB-30 bombers converted for passenger and freight services, following the southern route used by the RAAF Catalinas. This became the only air bridge between Australia and the UK — across the Pacific to the American west coast, across the breadth of the USA, then from the east coast across the Atlantic.

THE INDIAN OCEAN ROUTE

This state of affairs had been foreseen by some. In early 1939 Capt P.G. "Bill" Taylor, famous for his flights as pilot and navigator with Sir Charles Kingsford Smith, made submissions to the Australian government, in which he stressed "the need for a reserve air route across the Indian Ocean which could be used to maintain air communication with the United Kingdom in the event of the Singapore route being cut by war".[5]

Taylor's reputation was such that the Australian government chartered American zoologist and philanthropist Richard Archbold's Consolidated Model 28-3 (essentially a civilian PBY-2 Catalina) NC777, named *Guba* (also known as *Guba II)*, which Archbold had used during 1938–39 for an expedition to New Guinea. On June 4, 1939, Taylor, Archbold and their crew of pilot, navigator, radio operator and two engineers, set off from Port Hedland on the north-western coast of Western Australia for the Cocos (aka Keeling) Islands, an Australian-governed archipelago roughly halfway between Australia and Ceylon. However, even with two highly experienced air navigators aboard, they failed to find the island group and were forced to divert to Batavia.

Guba departed Batavia a few days later and, having located the Cocos Islands, alighted in a lagoon, where the group remained for a week, surveying the region for future flying-boat and land-based aircraft operations, later of use to the Royal Navy and RAF when selecting Indian Ocean bases. Further stops were made at Diego Garcia, just south of the Equator, and Mahé in the Seychelles before *Guba* finally alighted at Mombasa on June 21, having covered some 9,000 miles (14,500km) in a total of 80 flying hours.

This was the only time an Indian Ocean route was used until July 1943, when QEA was able to begin scheduled services across the Indian Ocean linking Australia with Ceylon, and from there connecting with the BOAC service at Karachi



VIA AUTHOR

ABOVE ***Catalina G-AGFM* Altair Star** ***rises on to the step during take-off from Koggala Lake. The RAF's Catalina IBs, powered by a pair of Pratt & Whitney R-1830-92 Twin Wasp air-cooled radial engines, were supplied against Lend-Lease requisitions, as were the two IVAs and sole IVB also used on Qantas's wartime Indian Ocean service.***

on to the UK. The service was an extension of BOAC's UK—India route.

The first non-stop Indian Ocean crossings were made in June 1942 from Exmouth Gulf in north-western Western Australia to Trincomalee on Ceylon's north-east coast by two Dutch Catalinas which had escaped from Java the previous month.[6] Three more return flights by Catalinas of No 321 Sqn, formed at Trincomalee in August 1942 with Royal Netherlands Naval Air Service personnel who had escaped to Ceylon from the Dutch East Indies, were made between Australia and Ceylon, the last in May 1943, non-stop from Perth to China Bay, Trincomalee, in 28½ hr.

In May and June 1943 seven proving flights were made by crews of No 222 Group RAF, from Koggala Lake to Perth using the first two Lend-Lease Catalinas allocated to Qantas, the final flight being the delivery of Catalina IB G-AGFM/FP244 under the command of Sqn Ldr Rumbold.

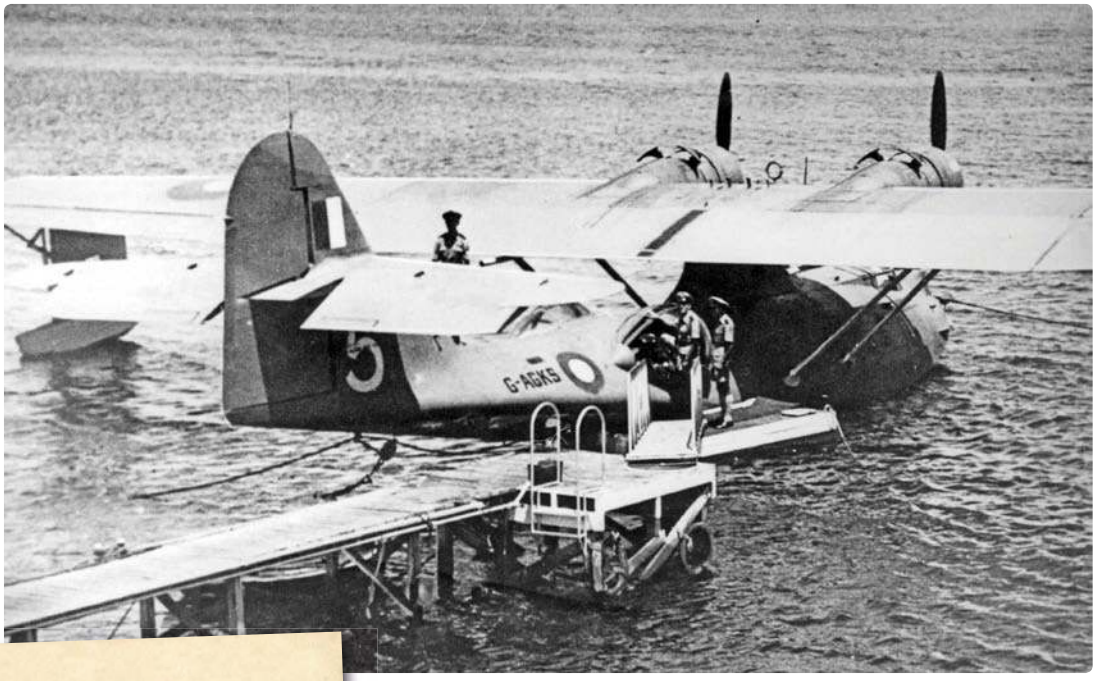
ESTABLISHING AN INDIAN OCEAN SERVICE

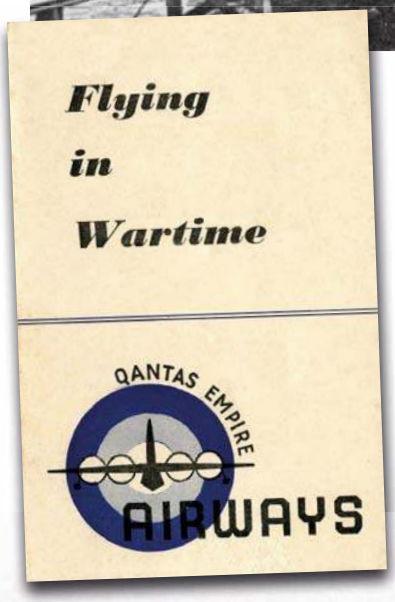
Meanwhile, on April 22, 1943, Sir William Hildred, the British Director General of Civil Aviation, advised Wilmot Hudson Fysh, Managing Director of Qantas, that BOAC had been directed to manage a civil Catalina service across the Indian Ocean, and that Qantas would be contracted as the operating agent. Four Lend-Lease RAF Catalinas would be supplied. Captain W.H. "Bill" Crowther of Qantas, an experienced Empire flying-boat captain, was appointed to head the Qantas Western Operations Division, established on the Swan River at Nedlands, Perth.

Qantas crews, most with extensive experience on Empire flying-boats, received type conversion to the Catalina from the RAAF at Rathmines, north of Sydney, and all were made members of the RAAF Reserve, although they continued to wear their Qantas uniforms. The first of the converted crews flew on the RAF's 1943 proving flights for familiarisation, and Senior Route Captain Russell B. Tapp, First Officer Rex Senior and an all-Qantas crew returned the RAF delivery crew to Ceylon in G-AGFM on June 29, 1943, departing for Perth as the first scheduled flight, 1Q-1, on July 10. It was a difficult flight, with adverse winds coming close to forcing a diversion, and all but the pilots being afflicted with food poisoning and unable to function. Two crews, led by Tapp and Lew Ambrose with assistance from Bill Crowther, carried the service until late August 1943, when additional crews arrived.

Bill Crowther suggested that each Catalina be named after one of the stars by which they were navigated — Altair, Vega, Rigel, Antares and Spica — but despite this, and each carrying a fleet number on the tail, crews referred to them by their British registrations. The small servicing dinghy was christened *Twinkle Star*.

Fysh, who was in the UK when the service was announced, returned to Australia on the eighth eastbound Indian Ocean service aboard G-AGFL/FP221, *Vega Star,* on what was to be the longest flight of the service, owing to a 12kt-average headwind, recorded in Crowther's logbook as





ABOVE *Built at Vancouver by Boeing Aircraft of Canada as part of the Mutual Aid Scheme, Catalina IVB JX287 went straight into BOAC service in March 1944 as G-AGKS, and that May became the last example to join the "Double Sunrise" fleet.*

LEFT *The cover of a pamphlet issued by QEA to keep the public apprised of the company's contribution to the war effort. Part of the back cover reads: "Since the outbreak of hostilities the company's staff has increased by over 400 per cent; flying personnel number over 100, including 70 pilots . . .".*

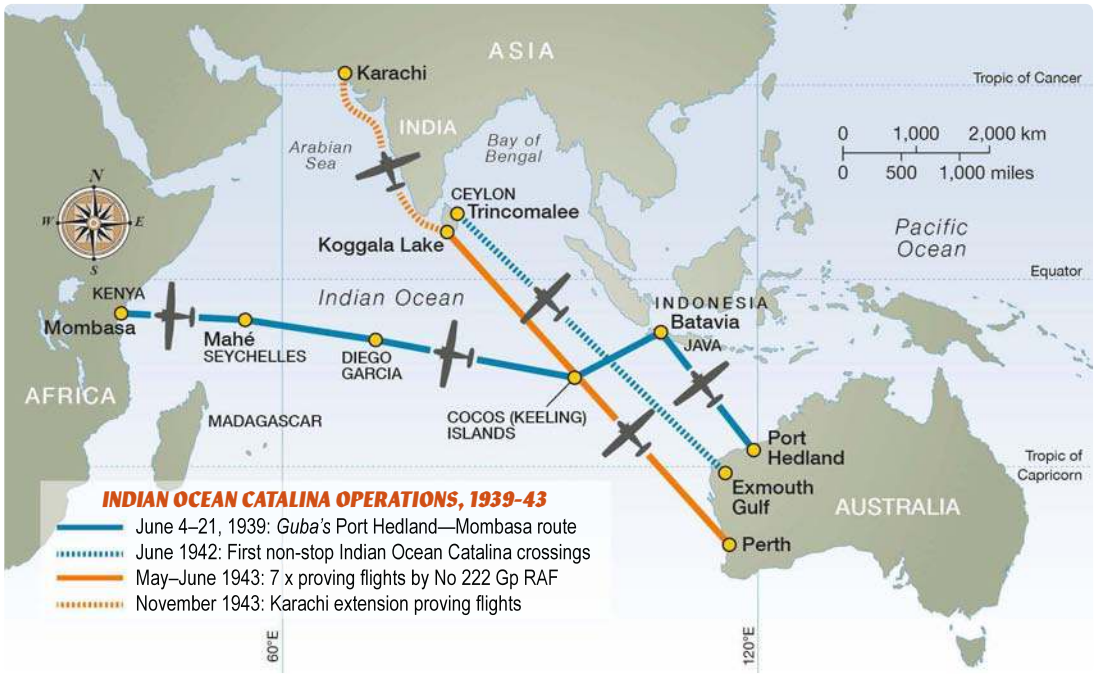
RIGHT *Captain W.H. "Bill" Crowther flew the final Short Empire flying-boat service out of Singapore on February 4, 1942, and was appointed head of the Qantas Western Operations Division in 1943.*



BELOW *Bearing its fleet number, "3", below the tailplane, Catalina IVA G-AGID* **Rigel Star** *is prepared for its next Indian Ocean crossing at Nedlands, Perth. Originally given the RAF serial JX575, this San Diego-built example was transferred straight to BOAC in March 1943, after which it was converted and delivered to Qantas that September.*

ALL PHOTOGRAPHS VIA AUTHOR





MAP BY MAGGIE NELSON

a wearying 32hr 9min. The most notable entries in Fysh's diary for the flight concern the length of the flight, how tiring it was for all aboard and the fact that, with the fuel overload and lack of dump-valves, it was some 11hr before the aircraft had lost enough weight to be capable of single-engined operation.[7]

In total, five Catalinas were delivered to Qantas; two IBs in July 1943, two IVAs in September that year and the fifth, IVB G-AGKS, in May 1944. The first two had been used by BOAC for six months on the Poole—Lagos, Nigeria, service and the other three were converted for BOAC and delivered to Perth. As aircraft availability permitted, Qantas further modified the aircraft at Rose Bay in Sydney Harbour, moving the eight auxiliary fuel tanks forward to improve the centre of gravity, and dump-valves were also fitted. A normal fuel load was 1,466 Imp gal and an overload of 1,988gal could be carried. At take-off the fuel alone weighed some seven tons (7,110kg).

The distance from Nedlands to Koggala Lake is 3,513 miles (5,655km), but diversions around poor weather often made it longer. The longest flight has been mentioned, but the shortest was still an exhausting 22hr 46min. The Catalina had a designed all-up weight of 27,000lb (12,245kg), and Qantas often flew its examples at 35,400lb (16,055kg), of which only around 50lb (22kg) was mail, 75lb (34kg) of food and refreshments, plus three to four passengers. Owing to the route being within reach of Japanese aircraft at certain points, the radio was switched on only to receive short weather reports and forecasts from Perth at scheduled times.

The second Qantas Indian Ocean flight, from Perth to Ceylon, also by G-AGFM *Altair Star*, was flown as 2Q-1 on July 22, 1943. Thereafter, one flight in each direction was flown per week. After two very-long-duration flights in the first few months of operation, including Fysh's 32hr flight, evaluations were made to determine the best combination of true airspeed (TAS), manifold pressure and propeller r.p.m. to achieve optimum endurance. As fuel burned off and weight decreased, the throttle was retarded to maintain a TAS of 115kt. The actual length of the flight depended on wind direction and speed and if weather diversions were required.

Climb-cruise techniques were employed to take into account local wind conditions and weight, and an endurance of at least 36hr and a range of 4,650 miles (7,485km) could be achieved with careful flying and seven tons of fuel. The total overload of four tons (4,064kg) required a different method of take-off from that of the standard military procedure, with back-stick not employed until effective elevator control was achieved.

SERVICES INCREASE

The delivery of the third and fourth Catalinas, IVAs G-AGID/JX575 *Rigel Star* and G-AGIE/JX577 *Antares Star*, permitted the service's frequency to be increased to three each fortnight in each direction by October 15, 1943. It released G-AGFM to fly non-stop from Perth to Sydney in 15½hr on the night of September 24/25, 1943, to begin the modifications to improve the aircraft for the service, including the addition of the fuel-dump valves. The latter were employed in service only six times, once causing the crew some embarrassment. On November 15, 1944, a flight



VIA AUTHOR

ABOVE ***Catalina* Altair Star** ***is inspected before another 3,510-mile (5,650km) non-stop flight across the Indian Ocean, by some margin the longest non-stop regular passenger flight made up to that time. When the service was closed in July 1945, the Catalinas had completed a remarkable 271 crossings, carrying a total of 648 passengers.***

engineer on his first crossing began the process of transferring fuel from G-AGIE's fuselage tanks to the wing tanks shortly after take-off, instead of waiting for the captain to call for this to be done. This meant that, over some hours, 200gal spilled from the tank overflow vents, causing the aircraft to return to Perth, where it had to dump four tons of fuel to reach the maximum landing weight.

As well as careful fuel management, precise navigation was of the utmost importance. A flight of more than 30hr over featureless ocean, much of it in darkness following a "Great Circle" route, required a high degree of skill from the crews, and, while the captains were heavily involved, specialist navigators were trained for the service. Fixes were obtained by dead-reckoning and star- and sunshots with bubble sextants.

Initially, the Cocos Islands were given a wide berth owing to the possibility of encountering Japanese fighters, but by late 1944 the islands became the only positive navigational fix available, by which time QEA navigators were able routinely to find the tiny atoll by "flying down the sun line" — something even master navigator Bill Taylor had found difficult just six years earlier.

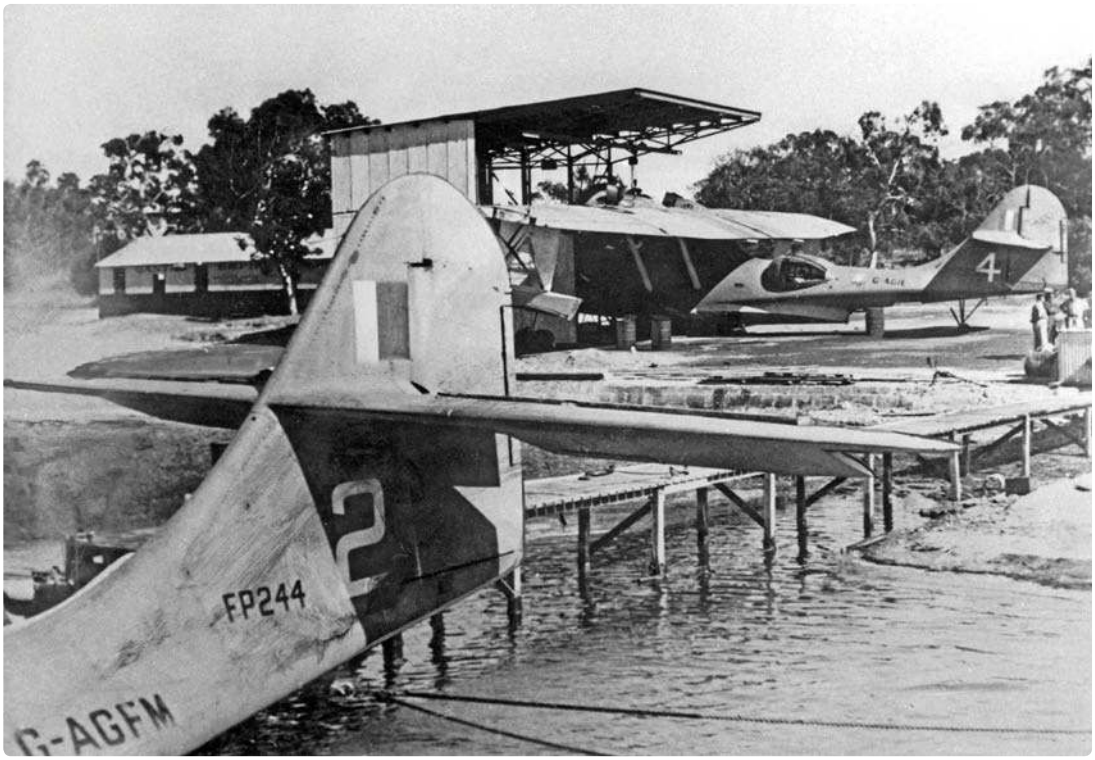
Neither of the bases at each end of the route were particularly suited to the operation. Koggala Lake, while a large RAF flying-boat base, was set up for Short Sunderlands. The main Catalina base at Trincomalee and the lake itself provided such a marginal distance for take-off that the Qantas Catalinas had to backtrack up a shallow creek to maximise the run. The Perth end had been established hurriedly on the Swan River at Nedlands, and working conditions were primitive to say the least, without a slipway to beach aircraft or even a covered workshop until mid-October 1943. Initially, the Catalinas had to be towed 2½ miles (4km) to the US Navy's Patrol Wing 10 base at Crawley Bay for refuelling, and some specialist equipment such as a spark-plug-removal spanner had to be borrowed there.

QANTAS EMPIRE AIRWAYS' CONSOLIDATED CATALINA IB/IVA/IVBs

Variant	Reg'n	RAF serial	Name
Catalina IB	G-AGFM	FP244	*Altair Star*
Catalina IB	G-AGFL	FP221	*Vega Star*
Catalina IVA	G-AGID	JX575	*Rigel Star*
Catalina IVA	G-AGIE	JX577	*Antares Star*
Catalina IVB	G-AGKS	JX287	*Spica Star*

ROUTE EXTENSION

In November 1943 Qantas extended the Indian Ocean route to Karachi to connect with the BOAC Sunderland service to the UK via Cairo, as despatches and passengers continuing their



VIA AUTHOR

ABOVE ***Two QEA Catalinas — G-AGFM and G-AGIE — at the rather primitive facilities at Nedlands. All five were scuttled off the Australian coast in late 1945, Hudson Fysh calling it "a dismal fate for these splendid 'boats which for two long years saw us through our most hazardous operation ever, without accident or mishap of any kind".***

journey beyond Koggala often faced delays and disruptions to the RAF and BOAC courier services from Ceylon to India.

The Catalina route extension was flown at night over water for safety and took 12½hr to reach the RAF station at Korangi Creek, near Karachi. The first eastbound service from Karachi to Perth covered a 1½-day duty period and 41½hr flying time, with one stop at Koggala.

The importance of the route can be gauged by the amount of effort and cost expended to carry a maximum of three passengers and a mere 150lb (68kg) of diplomatic and armed services mail per service. Fewer than 700 passengers earned membership of the "Secret Order of the Double Sunrise". If any of the passengers had wanted a second look at their certificate (**ABOVE RIGHT**) it would have been difficult; the service was flown mostly in the dark in a blacked-out aircraft!

Although there was sound reasoning behind operating flying-boats over such a long over-water distance, the realities of alighting on the open ocean in an overweight Catalina were not that much different from ditching a landplane — and QEA had wanted to run the service with Liberators from the beginning.



1 Qantas Empire Airways, established specifically for the operation of the Empire Service, was jointly owned by Qantas and Imperial Airways
2 Imperial Airways became part of the British Overseas Airways Corporation (BOAC) on April 1, 1940
3 19 Catalinas were ferried by Qantas, one (AH534) being delivered to the RAF at Singapore
4 Known to the USAAF as LB-30s, these retained their RAF serials and never carried USAAF serials
5 Taylor, Sir Gordon, *The Sky Beyond* (Sydney, 1963), p112
6 In total, five Dutch Catalinas made the trip, but only the final two were non-stop
7 Fysh, Sir Wilmot Hudson, *Qantas at War* (Sydney, 1968), p155

NEXT TIME *The author concludes the story of QEA's Indian Ocean wartime service with the airline's addition of Liberators and Lancastrian landplanes in 1944*



ALPHONSE PAPIN IN THE GYROPTÈRE ON LAKE CERCEY / VIA XAVIER ROUILLY

MESSIEURS PAPIN et ROUILLY'S Astonishing Whirling Leaf



The whirling descent of a single-winged sycamore seed has long held a fascination for children — and aerodynamicists. If the principle works in nature, surely it could be made to work as a basis for manned flight? **JEAN-CHRISTOPHE CARBONEL** takes an in-depth look at the attempts of two Frenchmen in the 1910s to create a jet-powered "Gyroptère"

UNTIL THE EARLY 20th Century, the concept of jet propulsion centred around the use of rocket technology. From the 1910s, however, engineers began to think about the use of compressed air to achieve similar effects. In 1910 Rumanian inventor Henri Coandă built what he later claimed was the first "jet aeroplane" based on such principles; the fact that it never properly flew and ultimately crashed in flames did not deter other inventors.

FIRST STEPS

Having worked on the principle of jet propulsion since 1908, two Paris-based engineers, Alphonse Papin and Didier Rouilly, presented a paper on jet-powered helicopters at the *Académie des Sciences* on January 14, 1910. On May 8, 1911, the pair applied for two patents concerning the use of compressed air for the propulsion of aircraft, both fixed- and rotary-wing.

Papin and Rouilly's somewhat "art nouveau" helicopter designs illustrated in the patent could have been lifted directly from French artist Albert Robida's representations of the Parisian future. Patent No 440594 described "a helicopter, [the] single propeller [of which] has a hollow blade and nozzles, its rotation being assured according to the aeolipile principle; that is, by a jet of air" (see panel, above right). Patent No 440593, applied for on the same day, dealt with "a process to ensure the lift and propulsion of bodies inside a fluid, for example craft for air or undersea locomotion".

The same year, the two inventors offered their helicopter concept to the French Army. The idea was enthusiastically received by Lt-Col Jean-Baptiste Estienne (the future "father of the light tank"), at that time the Director of the *Etablissement d'Aviation Militaire de Vincennes* (Vincennes Military Aircraft Establishment). Estienne believed that Papin and Rouilly's researches were of "immense" military interest.

In early 1912 the invention was reviewed by M Marchis, *Professeur d'aviation* at the famous Sorbonne university in Paris, who, after looking at the documentation provided and interviewing the two inventors, stated the following:

"Messieurs Papin and Rouilly are particularly competent in fluid mechanics. They [have] prepared the assembly of a full-scale machine by well-conducted scale-model testing. Through this research they have obtained very interesting results which will later be of great use. It cannot be contested that testing of a full-scale helicopter may take a long time, but the inventors who are familiar with industrial practice will be able to overcome such difficulties. To sum it up, I believe Papin and Rouilly's jet helicopter to be a viable proposition, and I hope they will be able to obtain the funding necessary to reach their goal."



HERO'S ENGINE: the aeolipile principle

AN AEOLIPILE (or aeolipyle), also known as a Hero's engine, is a simple bladeless radial steam-turbine which spins when the central water container is heated. Torque is produced by steam jets exiting the turbine, much like a tipjet or rocket engine. In the 1st Century AD, Hero of Alexandria described the device in Roman Egypt, and many sources give him credit for its invention.

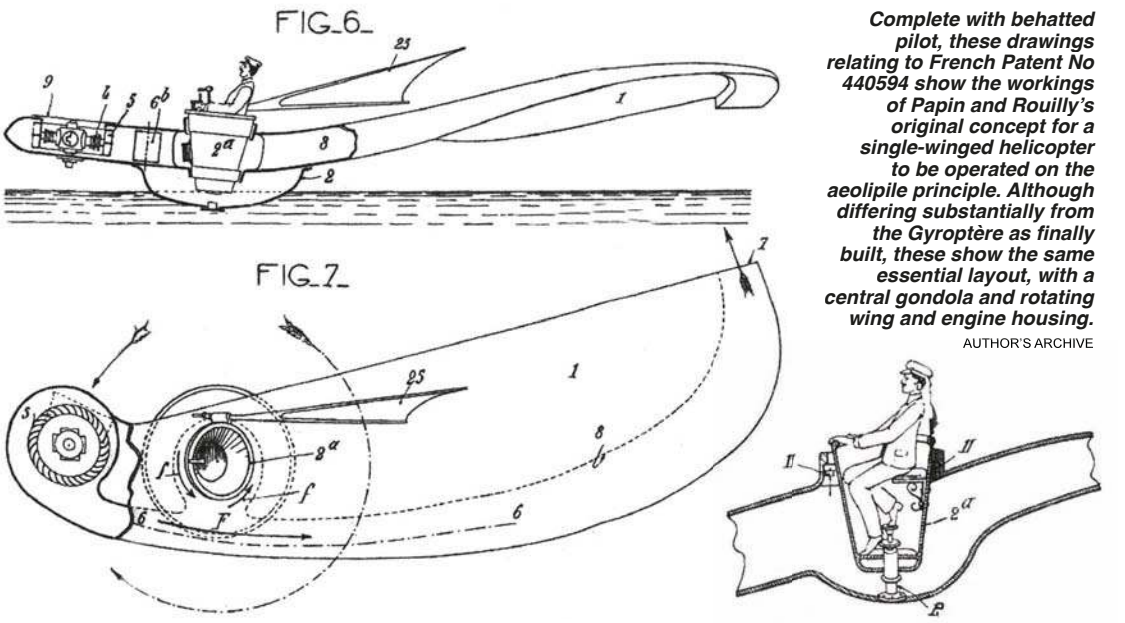
The aeolipile consists of a vessel, usually a "simple" solid of revolution, such as a sphere or a cylinder, arranged to rotate on its axis, having oppositely bent or curved nozzles projecting from it (essentially tipjets). When the vessel is pressurised with steam, the latter is expelled through the nozzles, which generates thrust owing to the rocket principle as a consequence of the second and third of Newton's laws of motion. **NS**

It is interesting to note that the term "jet helicopter" was already in use at the time.

In a letter written by Léon Lecornu of the Académie des Sciences, dated February 26, 1912, the machine is described for the first time as a "gyroptère", coined from two Greek words: *gyro* (rotating) and *pteros* (wing) — a rotating-wing machine. In April the same year the machine was described in the *Bulletin Officiel de la commission technique de l'Automobile-Club de France* (French Automobile Club Technical Commission Bulletin) in an article written by *Commandant* Paul Lucas-Girardville, engaged at that time in the design and construction of his own military helicopter. The article described the experiments undertaken by Papin and Rouilly in their aerodynamics laboratory, housed in a former paint factory in the northern suburbs of Paris.

FOLLOWING NATURE

Inspired by the aerodynamic properties of the sycamore seed, Papin and Rouilly's Gyroptère incorporated one large blade/wing (the patent refers to a propeller with one or more "wing"; the word "blade" is never used), and worked by means of atmospheric air being sucked into an intake at the centre of a main gondola containing a rotary engine and fan. (In the initial design the rotating engine alone was thought to be sufficient to act as a fan to suck air in, but the inventors quickly realised that a dedicated fan would be required.) The air, sufficiently compressed, was then thrust into the hollow single wing via two channels incorporated around the gondola. The



Complete with behatted pilot, these drawings relating to French Patent No 440594 show the workings of Papin and Rouilly's original concept for a single-winged helicopter to be operated on the aeolipile principle. Although differing substantially from the Gyroptère as finally built, these show the same essential layout, with a central gondola and rotating wing and engine housing.

AUTHOR'S ARCHIVE

compressed air would then exit at speed through a high-pressure nozzle at the outermost extremity of the wing. The thrust produced would force the wing to rotate around the central gondola and thus generate lift.

Papin and Rouilly claimed that the single-wing configuration offered the advantage of superior efficiency over a two-bladed propeller on the principle that the latter is more efficient than a four-bladed propeller. Experiments had shown that a jet-driven propeller or rotor offered similar performance to that of a standard lift-propeller/rotor, although Lucas-Girardville "expressed reservations about the flight characteristics of a single-bladed gyroptère in the turbulence that was likely to be encountered near the ground".

Piloting the craft was to be achieved by means of two systems: first, by varying the wing-incidence relative to the gondola and secondly by orienting the gondola via a rudder (which was never fitted) or through bleeding some of the compressed air through an "antenna" fitted to the gondola. The aircraft was designed as an amphibian, the gondola being affixed to a float in the shape of an inverted cap. The fairing for the engine and fan, which rotated around the gondola, was named the "violin" owing to its distinctive shape. These two devices would also be used to counteract the torque induced by friction on the gondola, around which the wing and violin rotated by means of tiny wheels acting like large ballbearings.

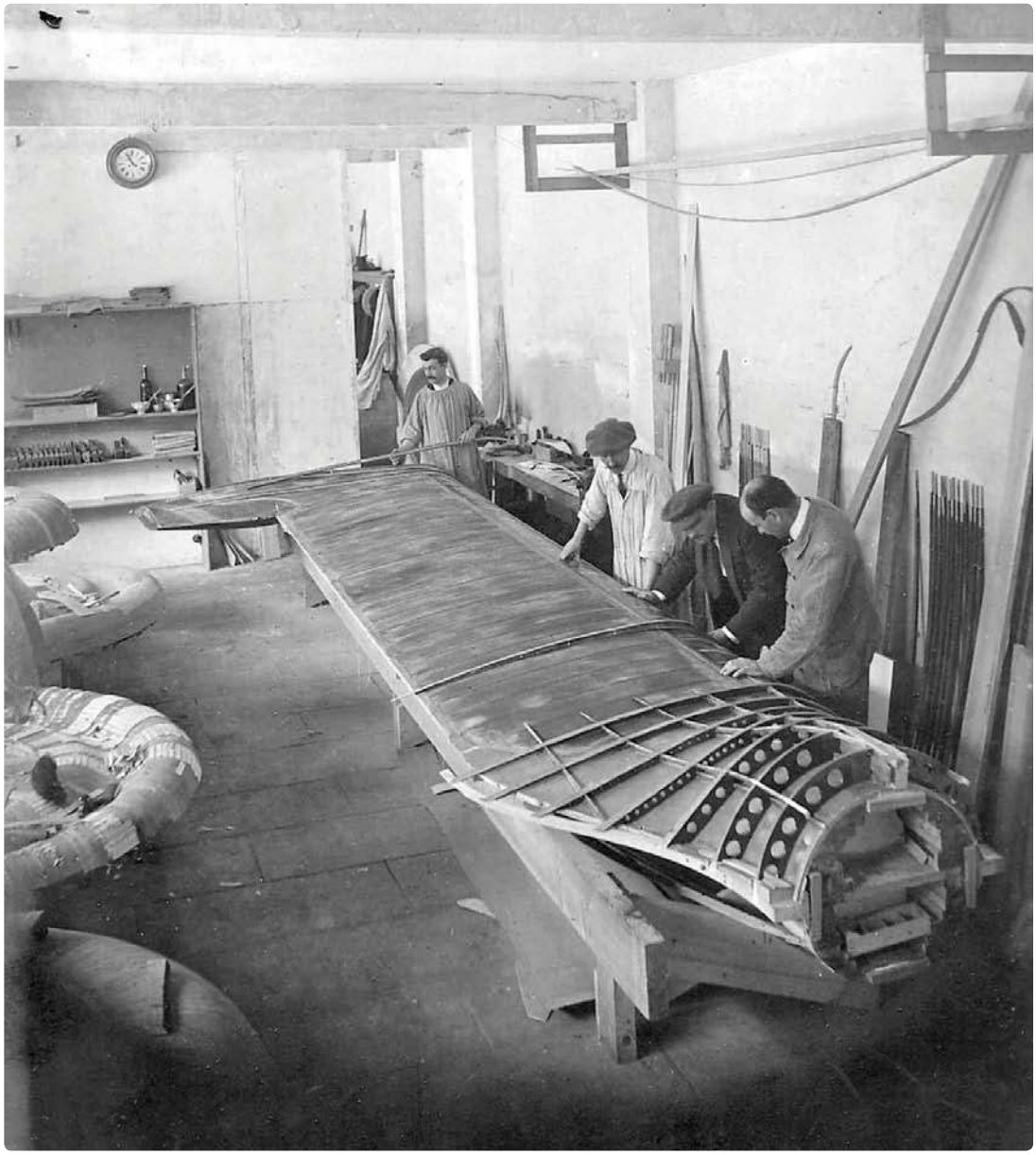
The inventors determined that the usable power output for the machine would be between 38 and 45 per cent of the engine's total power, but that this could be improved with the injection of hot exhaust gases from the engine into the compressed-air stream entering the wing, thus augmenting the thrust of the wing nozzle and therefore the lift generated by the rotating wing. Papin and Rouilly computed that to enable a 400kg (880lb) gyroptère with 16m² (172ft²) of lifting surface to fly, a 70 h.p. engine would be sufficient, although they planned to use a 100 h.p. Gnome rotary engine.

For propulsion in the horizontal plane, the pair estimated that it would be enough to tilt the axis of rotation in the direction of flight, a method used in all helicopters since. They added that "if this is not sufficient, it will not be difficult to find alternative propulsion systems, once the Gyroptère is flying". These rather optimistic thoughts show how little was known about rotary-wing flight at that time.

Papin and Rouilly, now supported by Estienne, Lucas-Girardville and *Enseigne de Vaisseau* Joseph Delage of the *Marine Nationale's* Technical Committee, wrote to the *Directeur de l'Aéronautique Militaire* (Director of the Army Aeronautical Department), Col Hirschauer, to ask him to fund the construction of a full-scale Gyroptère. At that time, the only military role envisaged for aircraft of any type was that of observation. After an exchange of correspondence, Hirschauer consented to a meeting, but did not warm to the project, and sent them back to Estienne.

A MILITARY CONTRACT — AT LAST

At this point the Army and the inventors were far from being on the same page. Estienne's initial idea was to suggest that Papin and Rouilly fit their "propulsion unit" to the flying machine Lucas-Girardville had been building over the previous three years at the Vincennes polygon, the plain adjoining the Château de Vincennes near Paris (an important proving ground for French armaments). This proposal was swiftly rejected,



XAVIER ROUILLY COLLECTION VIA AUTHOR

ABOVE ***Technicians get to work on the Gyroptère's massive single wing in the Grémont workshops in 1913. Although Papin and Rouilly's concept was radical in many respects, Englishman W.H. Phillips had flown a jet-powered experimental model helicopter (with revolving fans) actuated by gas-charged steam as far back as 1842.***

the inventors asking for financial support with no conditions attached. For Estienne, this would have created "an undesirable precedent".

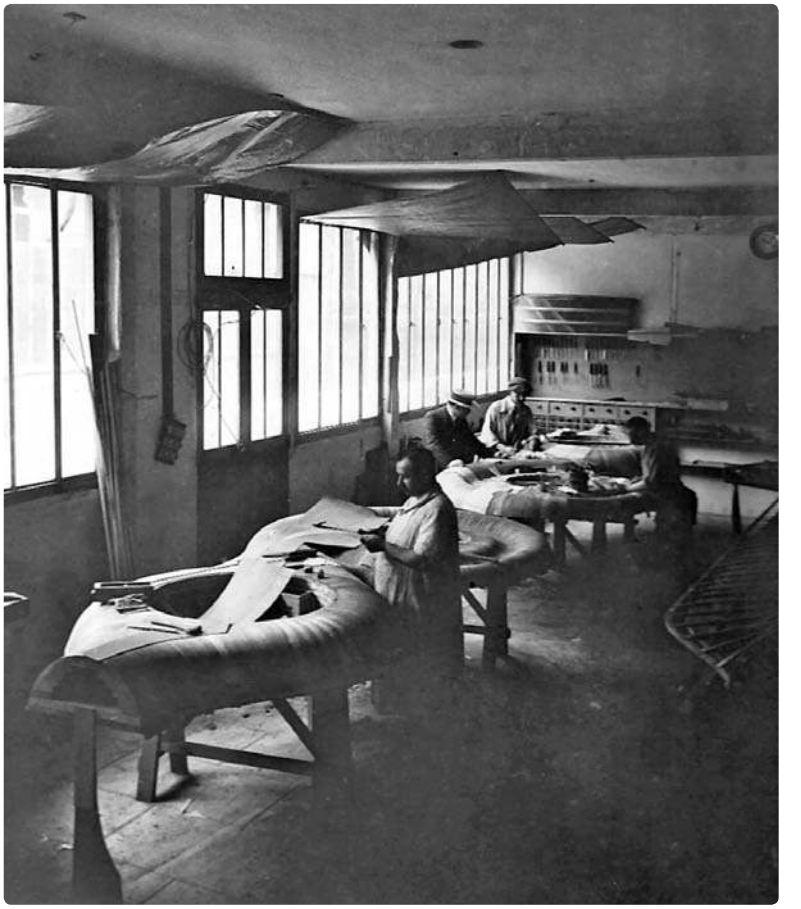
Instead, Estienne suggested issuing a contract to supply a full-size functioning machine to the Army. This was accepted by the inventors, who arranged for a demonstration of small 4kg (9lb) rocket-propelled gyroptères, in the hope of gaining the Army's support. The demonstration, using a primitive, thin rectangular wooden wing with a rocket at one end and a load at the other, was successful.

On September 30, 1912, Col Hirschauer, finally convinced of the potential of the project, sent a draft contract to the *Ministère de la Guerre* (Ministry of War), the latter adding stringent termination clauses. On November 4, the contract was finalised. A draft agreement was approved on November 30, covering "the supply of a helicopter-type flying-machine similar to French Patent No 440594, issued in the name of Messieurs Papin and Rouilly". The draft continued:

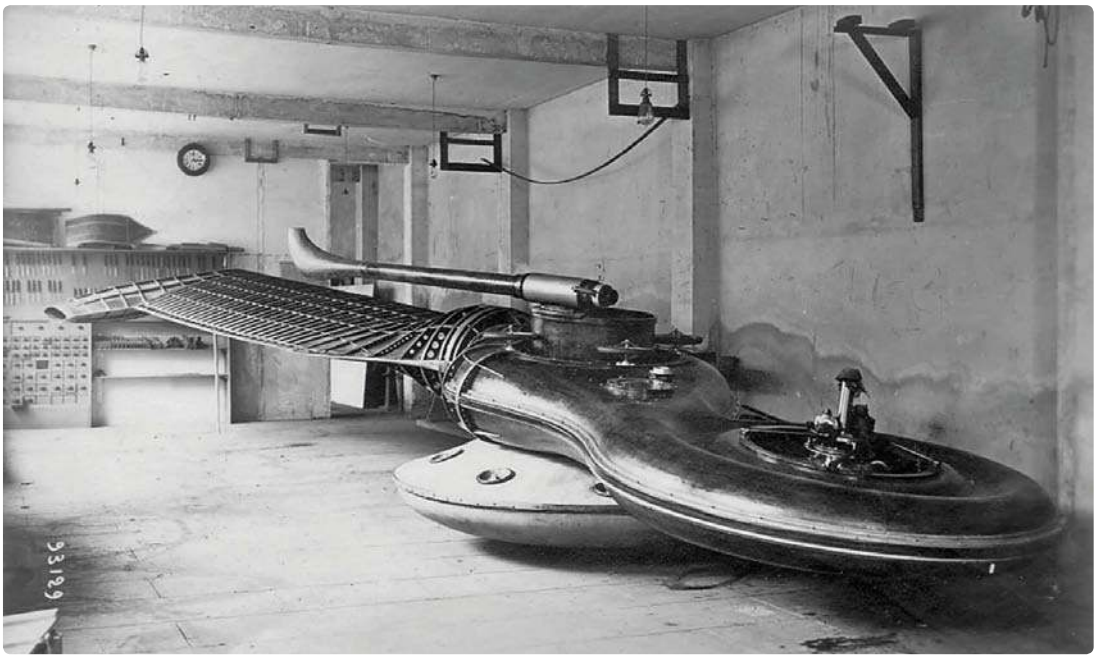
"Crewed by an aviator weighing 80kg [176lb], the aircraft will have to take off from a circular-shaped area of 50m [164ft]-diameter, assumed to be enclosed by a 10m [33ft]-high wall. After



ABOVE ***The gentleman on the right in this photograph is definitely Didier Rouilly, and, although unconfirmed, it is highly likely that his uniformed companion is his fellow co-creator of the Gyroptère, Alphonse Papin.***

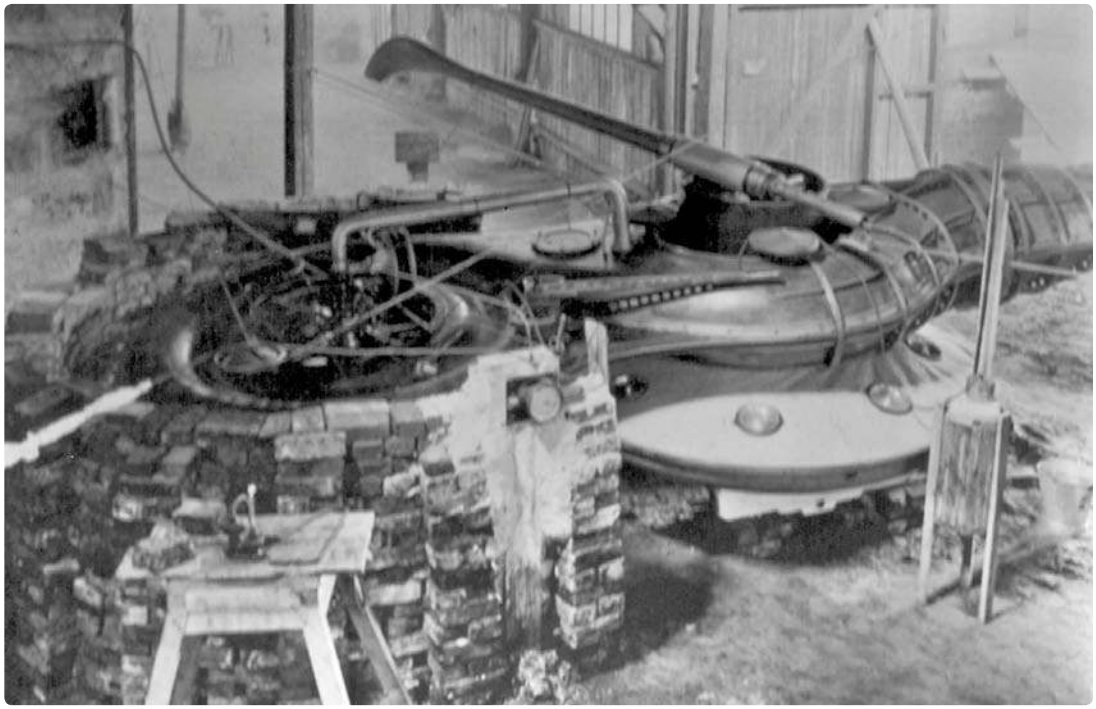


RIGHT ***Another view of the Grémont workshop in Paris, where work is being undertaken on the wooden"violin" section of the Gyroptère in 1913. The elegant curved shape of this section would have called for a high level of craftsmanship from the carpenters employed on the project.***



ALL PHOTOGRAPHS XAVIER ROUILLY COLLECTION VIA AUTHOR

ABOVE ***In the conspicuously tidy Grémont workshop, the completed and assembled Gyroptère awaits its move from to Lake Cercey in eastern France. Note the distinctive "antenna" fitted to the central gondola, to be fed with compressed air bled from the fan and used for directional control in place of a conventional rudder arrangement.***



XAVIER ROUILLY COLLECTION VIA AUTHOR

ABOVE ***Looking like something from H.G. Wells's novel*** **The Time Machine,** ***the finished Gyroptère has been taken outside the workshop for engine runs in a brick-built circular test rig. Note the piping connecting the engine and the main body — no details survive about what this is, although it may be a primitive form of turbocharging.***

taking off it will have to fly a closed circuit of a beam of 1,000m [3,280ft] at a minimum height of 100m [328ft] in a wind, the speed of which will be lower than 5m/sec [11 m.p.h.]. The machine will be delivered for initial testing no more than one year after the date of the signing of the present contract. The price of the machine is fixed at 120,000 francs."

The contract was approved by the Ministry on January 20, 1913, and notification sent to the two inventors in early February. A joint venture was then incorporated with a private investor, M Bunzli, and named "Société le Gyroptère".

On March 20, 1913, an engine was ordered from le Rhône. Construction work on the airframe was contracted to *Hélice Mercure* on April 6 and a contract for the fan was issued to *Société Anonyme de Coventry*. There was trouble ahead, however.

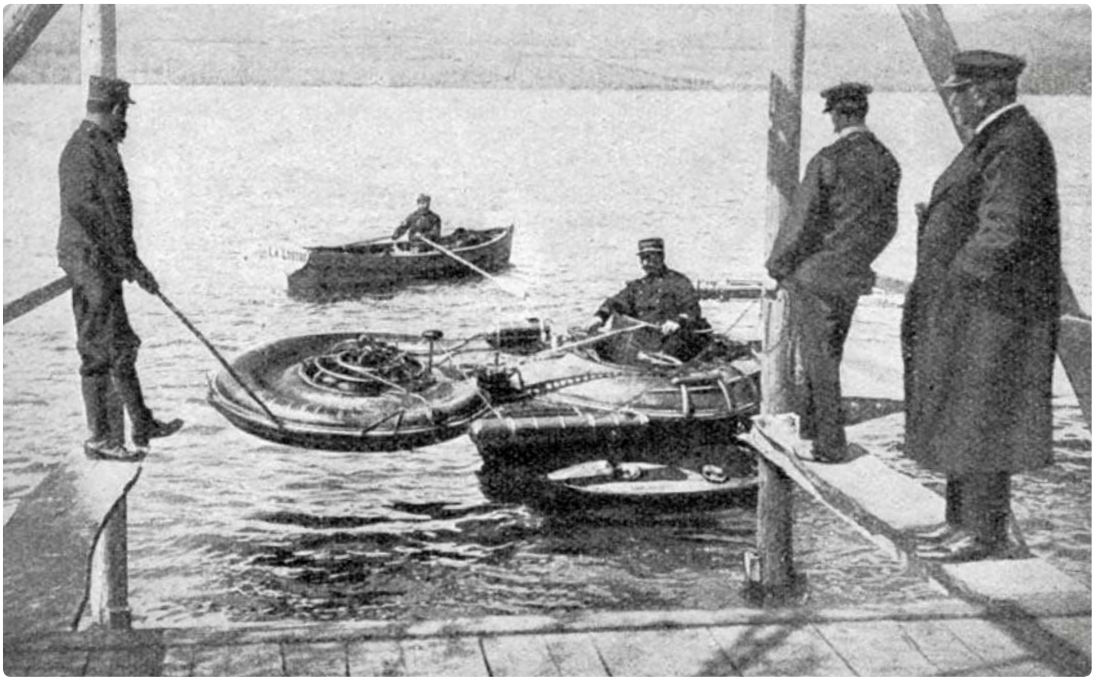
TRIALS BEGIN

Assembly of the Gyroptère had been completed under the supervision of *Ingénieur* Barby by the end of 1913 in workshops belonging to M Grémont — but it could not be tested before the specified delivery date. On January 13, 1914, the two inventors petitioned to get an extension of the deadline, offering to test the machine in the factory first, then, during the spring, in the open air. (Weather archives suggest that the winter of 1913–14 was exceptionally snowy in France.) The Director of the *Laboratoire d'aviation militaire* (Military Aviation Laboratory), *Chef d'Escadron* Raibaud, overseeing the contract, advised that an extension should be granted.

Testing of the machine began in February 1914, and after a few static runs in the factory it was dismantled and carried to l'Etang de Cercey (Lake Cercey) near Pouilly-en-Auxois in the Côte d'Or department in eastern France, contrary to the initial wording of the contract, which stipulated that it be tested at the Vincennes polygon.

Lake Cercey was selected "due to its shape, depth, ease of access and surface; all things which made it favourable for this kind of test". Sharing this idea with the Vincennes Aviation School, the inventors thought that "testing on firm ground, contrary to what is good for an aeroplane, is not to be recommended for a helicopter". A small shed was built to protect the Gyroptère from the weather, along with a wharf and launch-crane, all of which was ready when the machine arrived there in June 1914.

Comparison of photographs taken in the workshop and later at the lake reveals that the machine underwent some changes: the wing was braced with external wires, as it tended to flex when stationary; two external oil tanks had been added to the sides of the violin (suggesting the machine used a large quantity of oil during operation), and tubing now linked the centre of the engine fairing and the violin, although no explanation for this has been given. The effect of these modifications was a weight increase of 100kg (220lb) — 25 per cent of the take-off weight.



LA SCIENCE ET LA VIE VIA AUTHOR'S ARCHIVES

ABOVE ***In June 1914 the Gyroptère arrived at Lake Cercey, where it was manhandled into the water using a specially constructed wharf and crane. Here a uniformed Papin is seen in the gondola before the rowing boat behind him is used to tow the unwieldy contraption out to the middle of the lake for testing. Note one of the oil tanks added to the violin.***

Testing was about to begin in late August 1914 when the First World War broke out, resulting in the mobilisation of the inventors and their team.

The military authorities left one of the inventors' employees on the premises, tasking him with continuing the tests, a move later criticised heavily by Papin and Rouilly. During the winter of 1914–15, with the military situation stabilised to some degree, Papin managed to get himself posted for "ministerial duty" at Lake Cercey to continue with the testing. He wrote in his post-trials report:

"[On arrival] I found the machine in poor condition, because some of the materials had deteriorated under temperature changes; mostly a part forming the shock absorber supporting the entire machine. This part was made of rubber foam, a material which is no longer available since the laboratory producing it has closed, and it needed urgently replacing before one could try using the aircraft."

A WINTER BY THE LAKE

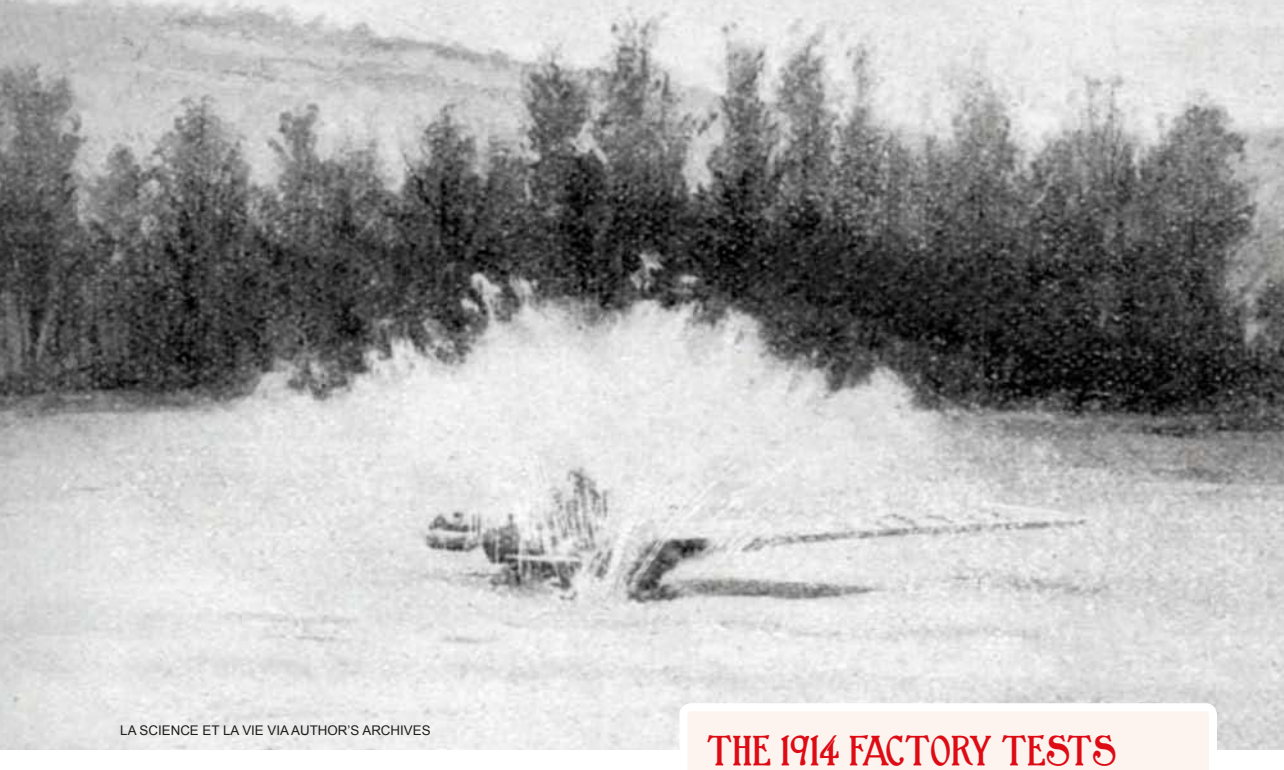
Difficult weather conditions certainly did little to help and the trained, experienced civilian test crew had been drafted into the military. Therefore, in order to prepare for the tests, Papin had to call on "troops passing by". He managed to accomplish the trimming of the full-size machine, but the positioning of each part required numerous small adjustments to make it ready, something that may not have been considered sufficiently while designing the machine. Papin stated:

"These fine-tunings cannot be achieved just by moving a nut . . . therefore for each such trimming it requires two weeks if we have access to all the required means, but more often twice as much time in the conditions in which we operate. [Papin also referred to 'short-lived missions of a week or couple of weeks'.] That is why we have been able to complete only one such trimming, because we only had one full month of continuous operation."

Papin nevertheless tried to project optimism in his report: "All this trimming will probably not be required on further machines".

After each modification, the machine was tested, but never achieved a complete take-off — only 47 r.p.m. was achieved, whereas 60 r.p.m. had been computed as the speed required to achieve take-off — although it did lift partly out of the water according to Papin. The undersurface of the float had been painted white with concentric red circles to help gauge how much of the machine had lifted out of the water. Each circle corresponded to a lift of 50kg (110lb). The surviving poor-quality pictures of a take-off attempt mostly show great sprays of white foam completely obscuring the machine, including the white and red circles! It appears that as r.p.m. of the wing increased, the machine became unstable on the water and thrashed left and right on the surface of the lake. The pilot for these tests was probably Alphonse Papin himself. According to the inventor, about two-thirds of the required lifting power of 600kg (1,320lb) had been achieved.

Such was the situation in March 1915. The



LA SCIENCE ET LA VIE VIA AUTHOR'S ARCHIVES

ABOVE ***This very poor-quality and heavily retouched image displays much thrashing about with little to show for it, probably taken during the attempt on March 31, 1915, to fly the Gyroptère. With so much spray, it is impossible to determine whether the machine is actually in the process of lifting itself clear of the lake's surface — naturally, Papin claimed it was.***

inventors hoped to do "one or two dismantlings" and some fine-tuning to reduce the machine's weight, and maybe replace the engine with a more powerful le Rhône example. They feared that the need to add weight to improve the weight distribution had overloaded the machine, hence the need for a more powerful engine.

An examining board, led by *Capitaine* Robert with *Lieutenant du Génie* Soreau, both attached to the Army's aviation section, was present at a test on March 31, 1915, in which the Gyroptère reached 47 r.p.m. in what Papin described as "poor weather". The inventor told the board that he needed at least another three months to solve the weight problems and achieve flight. Ever the optimist, Papin thought that, "considering the urgency of the situation", the production of six to 12 Gyroptères could be initiated over the following five months, the resulting machines being built to a simplified design. He hoped to see operational Gyroptères in service by early 1916. Contacts had already been made with subcontractors to obtain the required materials. The board, however, came to a different conclusion and recommended that the trials be halted and Papin be returned to his regiment.

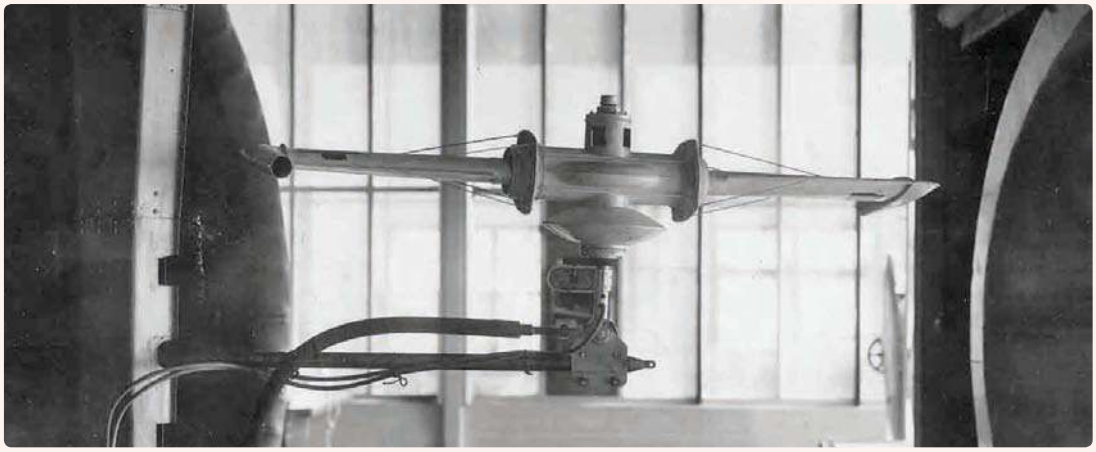
In November 1916 Papin and Rouilly came up with a new proposal suggesting the construction of "definitive machines, with more powerful engines, based on the experience accumulated

THE 1914 FACTORY TESTS

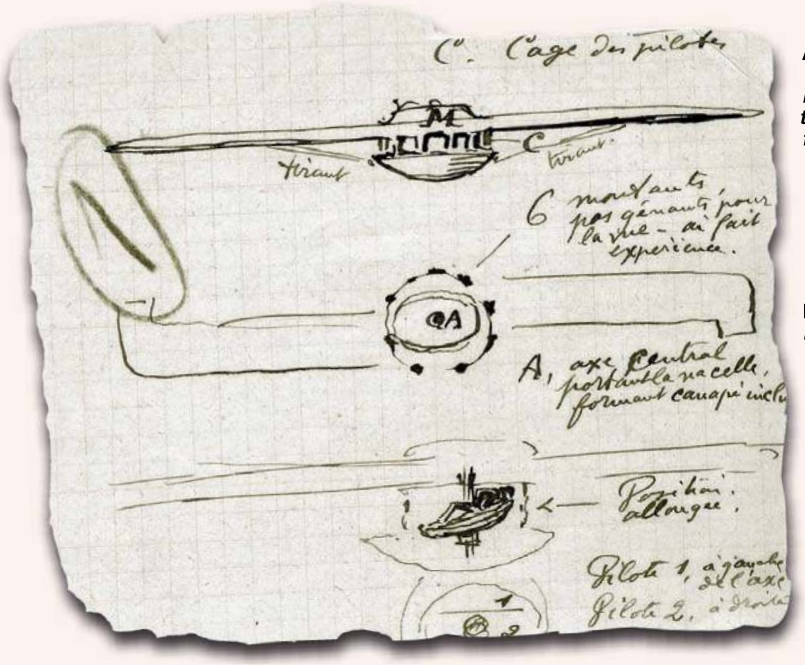
IN 1916 ALPHONSE Papin wrote a report on the 1914 factory tests, claiming that 56 different studies had been required, "most dealing with all-new devices, for the simple reason that there was nothing available which could be bought 'off the shelf' and adapted for such a innovative machine — not even the engine".

Papin went on to list the various modifications required and tasks to be undertaken as follows:

- the engine was modified to enable it to bear the attendant gyroscopic forces, and its cooling system adapted to work with an engine mounted horizontally instead of vertically, as in an aeroplane;
- the engine was modified to enable it to be started from the gondola;
- to control various devices in rotation from a stabilised gondola, to avoid the latter getting jammed and to allow for a flow of air to be bled into the gondola to feed the directional antenna, in order to stabilise the gondola directionally;
- to build an ultra-light paddlewheel to be used as a fan and to make the joint around the fan completely airtight;
- to design a fuel regulator resistant to centrifugal forces:
- to design an *"émulseur à air"* (probably a device using compressed air) to purge water from the float in the event of it being damaged;
- to design a wing that could be easily dismantled;
- to ensure the machine could navigate by its own means via an air-jet (it is unclear if by "navigation" it is implied navigation on the surface of water: during the trials the Gyroptère was moved on water by means of a small tugboat);
- to build an ultra-light float;
- to be able to vary the pitch of the wing using the gyroscopic effect of the engine. **JCC**



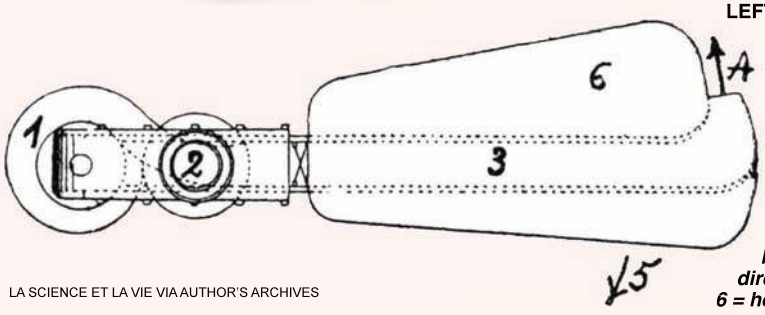
XAVIER ROUILLY COLLECTION VIA AUTHOR



ABOVE ***Messieurs Papin and Rouilly continued their studies into gyroptère-style aircraft after the end of the Great War. Their final three-dimensional design was this model of a two-bladed gyroptère with tipjets working on the aeolipile principle, seen during windtunnel testing at the*** **Laboratoire Aérodynamique Eiffel** ***in Paris.***

LEFT ***This 1920s sketch by Didier Rouilly shows another concept for a gyroptère, this time a symmetrical (twin-rotor) version for two crew members positioned in a prone position*** **("position allongée")** ***on a bench arrangement situated within a "cage" sandwiched between the float and the rotor assembly. The motor was to be housed at the top of the machine, above the rotors. It would not have been for the faint-hearted!***

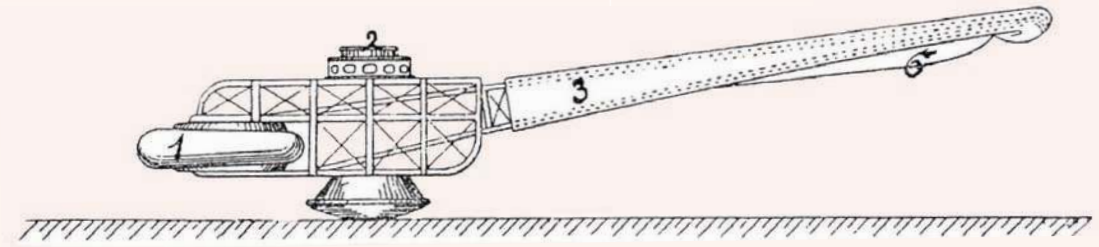
XAVIER ROUILLY COLLECTION VIA AUTHOR

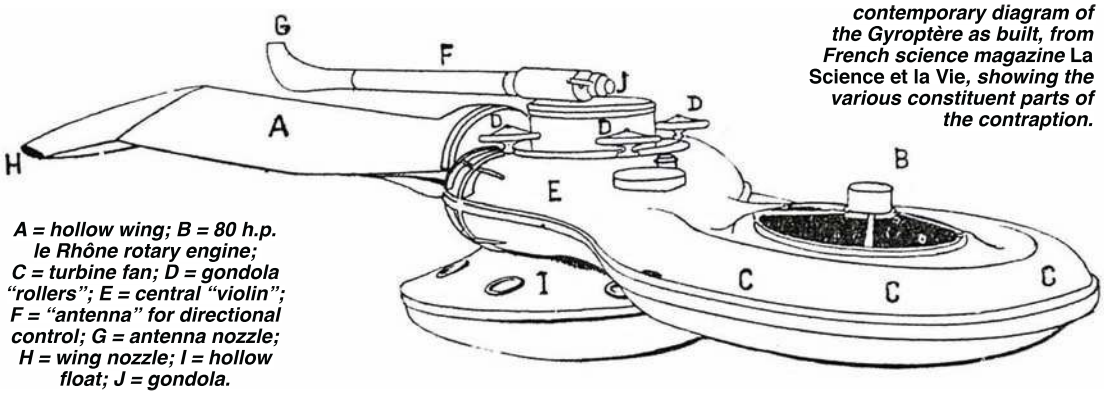


LEFT & BELOW ***A drawing from French science magazine*** **La Science et la Vie,** ***circa 1917, this time of a simplified gyroptère designed by Papin and Rouilly in 1916 for operational use with a simple truss structure replacing the complex "violin".***

1 = engine and air compressor; 2 = gondola for crew; 3 = pipes for compressed air; 4 (looks like an "A") = wing nozzle; 5 = direction of wing rotation; 6 = helical wing.

LA SCIENCE ET LA VIE VIA AUTHOR'S ARCHIVES





BELOW ***Another contemporary diagram of the Gyroptère as built, from French science magazine*** **La Science et la Vie,** ***showing the various constituent parts of the contraption.***

A = hollow wing; B = 80 h.p. le Rhône rotary engine; C = turbine fan; D = gondola "rollers"; E = central "violin"; F = "antenna" for directional control; G = antenna nozzle; H = wing nozzle; I = hollow float; J = gondola.

during the tests of the Gyroptère". No more work on the machine was undertaken during the war, however, and in 1919 the derelict prototype was sold to a wood merchant for 1,500 francs.

APRÈS LA GUERRE

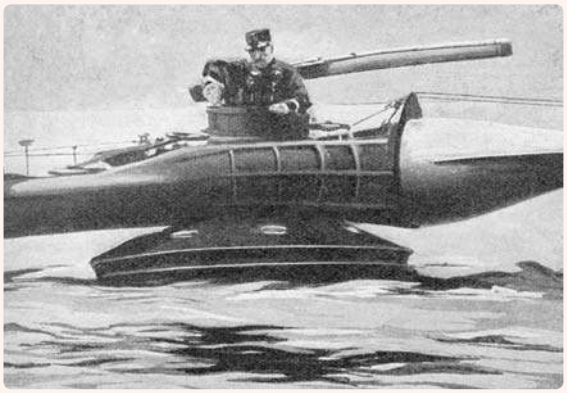
In 1922 Papin and Rouilly called on the Ministère de la Guerre to finance the construction of a new Gyroptère designed as a two-seater with a conventional two-bladed rotor. For this new design the position of the crew was studied at length. Two basic configurations were studied: (1) the two crewmembers were to be placed on a bench in a "cage" placed between the float and the rotor assembly; (2) the crewmembers were seated in the cage but the latter was above the rotor assembly. The second configuration was thought by the designers to be "more reassuring for the pilots", but also appeared to be a more difficult design for two reasons: the centre of gravity would be located in a higher position and from an operational perspective, the crew would not be in a good position to perform their intended roles of observation and/or bomb-dropping.

The new design was favourably received by the *Commission Aéronautique* and a new contract was signed by Gen Fortant of the *Service Technique Aéronautique* (STAé). However, this contract did not completely cover the cost of the construction of the machine and no private investor came forward to make up the shortfall. Therefore, with heavy hearts, the two inventors requested the termination of the contract. Many names had been thought of for the new machine, including *Abeille* (bee), *Bourdon* (Bumblebee) and *Papillon* (Butterfly). It appears that the 1915 demonstrator was retrospectively named *Chrysalide* (chrysalis).

In 1928, following the establishment of the new Air Ministry, Papin and Rouilly made yet another attempt to acquire official backing, this time from the Ministry's M Laurent-Eynac. For the sum of 240,000 francs the pair offered to build, within one year, a simplified gyroptère, a demonstration example of which was to take off from ground or water, with a pilot, without any height target and move horizontally, without setting any speed or distance objectives. The engine was to be supplied by the newly formed Air Ministry.

The project was less ambitious than that of 1912, as no quantified objectives were set, and the two

I FLEW THE GYROPTÈRE . . .



IN HIS REPORT *"State of the Art in November 1916"*, Alphonse Papin **(RIGHT)** wrote the following about piloting the Gyroptère:

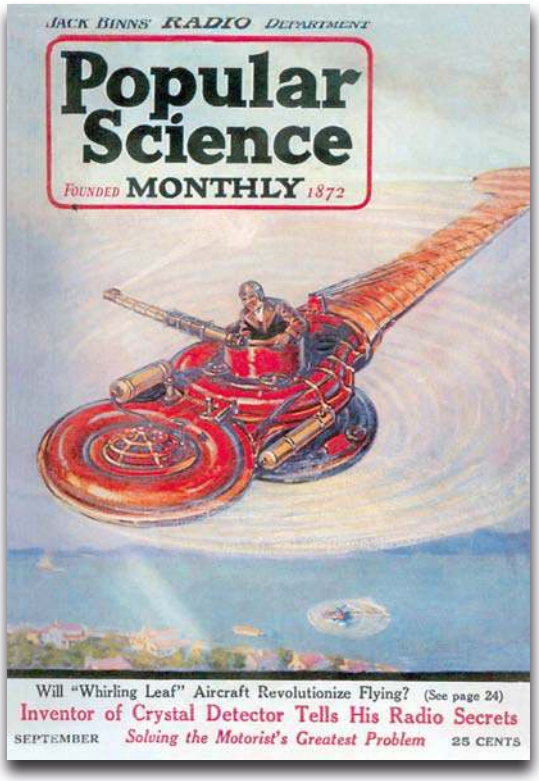
"From inside the machine, one felt clearly that it lifted itself and only weighed partly on the water . . . pointing the gondola in a direction was easy and, even considering the abnormal actions which could have troubled the controls, it could be maintained in a fixed direction or rotated in either direction (propeller-wise or counter-propeller-wise) at the required speed.

"The feeling of safety was complete, and it had to be as there was no capsizing when hitting the water. During the test it was apparent that this machine, which is just a giant gyroscope, was the most stable vehicle ever created. When the machine reached 47 r.p.m., the lashing of water on the hull and the induced reactions required me, in order to increase the speed, to leave the seat and stand on tiptoe to dampen the shocks and avoid being sent overboard. At that very moment, one could perceive very neatly what was possible with the machine, and how much more it could take . . . one felt in control inside." **JCC**

inventors managed to get a meeting with the Air Ministry on November 27, 1928. A *demande d'attribution* (request for funding) was submitted by the inventors to the Ministry's research department. Representing the latter, Col Robert and Ingénieur Rouanet were initially reluctant to fund it, although in February 1929 it was agreed to build an unmanned half-scale machine for trials.

Accordingly, in March 1930 a revised proposal was forwarded to Col Aleyrac, Deputy Director of the STAé's Research Department. The inventors were not entirely happy with this solution, and in a July 1930 letter to the Ministry requested that the project be reconsidered as a manned vehicle. Meanwhile, models were tested in the windtunnel at *Laboratoire Aérodynamique Eiffel*. An undated document describes a twin-engined "Gyroptère D", which was to be "symmetrical" (two-bladed). It was expected that the fully equipped machine would weigh 1,200kg (2,645lb), each of the two engines providing 200 h.p. to generate a rotation speed of 1·2 rev/sec.

Papin and Rouilly offered to build this machine in 12–14 months for 350,000 francs. It was never built, however, the project remaining a model in the Eiffel Laboratory. The model was the subject of a report submitted to the STAé on February 8, 1934, which reads: "Regarding performance, this experimental machine is quite poor. We did not attempt to study stability; the results of the calculation of pitch are too imprecise. Regarding power, the results obtained on the bench are near normal but they are still imprecise. In summary, the Papin-Rouilly machine is quite useless in its current state". It was, finally, the end of Messieurs Papin and Rouilly's not-so-astonishing whirling leaf.



VIA AUTHOR

ABOVE ***A somewhat fanciful artist's impression of a vivid scarlet Gyroptère appeared on the cover of the September 1922 issue of American magazine*** **Popular Science Monthly,** ***which carried an article entitled*** **Will This "Whirling Leaf" Flying Machine Solve Greatest Problem in Aviation?** ***Unfortunately for Papin and Rouilly, the answer proved to be a resounding no!***

ACKNOWLEDGMENTS *The author would like to express his profound gratitude to Xavier Rouilly, grandson of Didier Rouilly, who provided most of the information and material for this article*

PAPIN-ROUILLY GYROPTÈRE DATA Compiled by Jean-Christophe Carbonel

	1914–15 Gyroptère Modèle B *"Chrysalide"*	July 1922 Gyroptère Modèle D *"Papillon"*	1932 Gyroptère Modèle D
Type	Demonstrator	Reconnaissance/bomber	Reconnaissance
Powerplant	1 x nine-cylinder 80 h.p. le Rhône rotary engine	—	2 x 200 h.p. rotary engines (probably le Rhône)
Rotor/wing	Single-bladed	Two-bladed	Two-bladed
circumference	54m (177ft 2in)	—	
diameter	16m (52ft 5½in)	Approx 33m	
Rotation speed			
design	60 r.p.m.	—	72 r.p.m.
actual	47 r.p.m.	—	—
Wing area	—	40m² (431ft²)	40m² (431ft²)
Crew	1	2	2
Weight			
design	400kg (882lb)	—	1,200kg (2,645lb)
actual	600kg (1,323lb)	—	—

No data available regarding the simplified variant of 1917 (Modèle C)


The Automobile
If you love old cars, or know someone who does, *The Automobile* is for you. As the world's only monthly magazine devoted to the first 75 years of motoring, we aspire to be the journal of record.
We draw on an international stable of respected contributors, all authorities in their field, who delve deep into the archives to discover hitherto unpublished information and original images. With entertaining and elegantly written articles, many enlivened by striking commissioned photography, the result is a delight from cover to cover.
QUOTE AC04 AND RECEIVE 15 ISSUES FOR THE PRICE OF 12
CALL 01306 628385 OR VISIT
WWW.THEAUTOMOBILE.CO.UK
TO SUBSCRIBE TODAY


A New Journal Dedicated Exclusively to Pre-1920 Aircraft
THE FLYING MACHINE
Early Aero Quarterly
HISTORICAL RESEARCH
FULL-SCALE PROJECTS
NEWS / EVENTS
DIGITAL & PRINT FORMATS
NO SUBSCRIPTION REQUIRED!
www.aerodynamicmedia.com
Aerodynamic Media
info@aerodynamicmedia.com



Bad Vibrations

Solving the Hawker Typhoon's structural problems

Digging deep into the archives, **RICHARD SETH-SMITH** uses contemporary documents, and a recently rediscovered letter written by Hawker's chief test pilot Philip Lucas in 1976, to piece together a trail of evidence revealing exactly how Hawker and the Royal Aircraft Establishment solved the structural problems that blighted the Typhoon's early career — and which killed his test-pilot father

DURING 1942–43 more than 25 pilots were killed in incidents in which their Hawker Typhoons broke up in flight. All but one were Service pilots, the exception being Kenneth Seth-Smith, Hawker's experimental test pilot — and my father. Much has been written about the aircraft and its development into the potent ground-attack machine that would play a major part in the Normandy campaign and the Allied advance into Germany. However, the causes of — and solutions to — the structural problems which plagued the type's early service have never been fully explained in books and articles, other than by oblique references to vibration and other issues. Now, through the content of a rediscovered 1976 letter from Hawker's chief test pilot, Philip Lucas, to John Grierson, Hawker and later Gloster test pilot, and extensive research by the Farnborough Air Sciences Trust (FAST), the causes and solution can be fully explained.

Gloster production

The history of the early development of the Typhoon is well-known, so we join the story after the initial batch of 15 had been completed at Langley and the production programme shifted to Gloster's Brockworth factory. All experimental and development testing remained based at Langley, which had good links both to Hawker's offices at Kingston-upon-Thames and the manufacturer's rehoused engineering and design headquarters at Claremont, an 18th-Century Palladian mansion near Esher in Surrey.

The Typhoon's 24-cylinder sleeve-valve Napier Sabre engine, although capable of producing some 2,200 h.p., was suffering from significant reliability problems, and it soon became apparent that hopes for good high-altitude performance from the type were not going to be met, owing to its thick-section wing. Nevertheless, the Typhoon was meeting its specified target of 400+ m.p.h. (645+km/h) at 25,000ft (7,600m).

Typhoon production began at Gloster in August 1941, with first deliveries to squadrons beginning that September. The first batch of 250 machines was completed by June 1942 and the second batch of another 250 by September of that year. Early squadron experience with the machine was often difficult. Serviceability was low, engine failures frequent and the aircraft was not easy to fly. Compared to the Hurricanes and Spitfires that pilots had previously experienced, it was heavy on the controls and unforgiving. There were accidents and losses, but this was to be expected with a new type of aircraft entering service.

Some sources suggest that two Typhoons crashed in late 1941 or early 1942 owing to tail failure. It is known that R7592 dived into the ground on November 1, 1941, possibly owing to carbon-monoxide poisoning of the pilot, and that R7618 crashed in bad visibility on May 13, 1942. Before that, R7637 had spun into the ground on March 8, 1942, and R7625 had crashed before delivery on March 27, although in none of these cases was structural failure thought to be the cause. The first Typhoon accident in the RAF Museum's accident-card files specifically to state structural failure occurred on July 29, 1942, when R8633 of No 257 Sqn crashed 2½ miles (4km) from its base at High Ercall in Shropshire, with a mere 5½ flying hours on the clock.

The squadron was in the process of swapping its Hurricanes for Typhoons and the pilot, Plt Off McDunnough, although experienced, had just 1½hr on the latter. The accident report reveals that, following authorised aerobatics at about 15,000ft (4,600m), the aircraft "then came down in a straight shallow dive at a high but reasonable speed, with engine partly throttled-back, to

OPPOSITE PAGE ***The fourth production Typhoon, Mk IA R7579, shows its characteristically muscular Hawker design during an early test flight.*** **BELOW** ***The Mk IB differed from the IA in being fitted with four Hispano 20mm cannon in place of the latter's six 0·303in machine-guns. This example, R7646, went on to serve with No 56 Sqn.***

TAH ARCHIVE x 2





AUTHOR'S COLLECTION

LEFT ***The Hawker test-pilot team in 1939. From left to right: chief test pilot Philip Lucas; John Grierson, production test pilot; Kenneth Seth-Smith, production and later experimental test pilot; Australian Dick Reynell, experimental test pilot, who was killed in action while flying a Hurricane with No 43 Sqn in September 1940.***

BELOW ***Part of the wreckage of Typhoon IB R7692, in which the author's father was killed while performing a relatively simple test-flight from Langley on August 11, 1942. Exactly a week later another Typhoon IB, R7644, was lost under similar circumstances.***

between 2,000ft [600m] and 4,000ft [1,200m], when it began a turn to starboard with no noticeable flattening out and the tail unit broke away, falling in three pieces". The report continues:

"Examination of the wreckage found that the tail unit had broken away at or aft of Frame K [the transport joint — see glossary on page 77]. This, without the port tailplane and elevator, rudder or mass-balance, was recovered about a mile [1·6km] from the main wreckage. The port tailplane with elevator was [found] a quarter of a mile [0·4km] further on. The elevator mass-balance was found slightly ahead of the main wreckage."

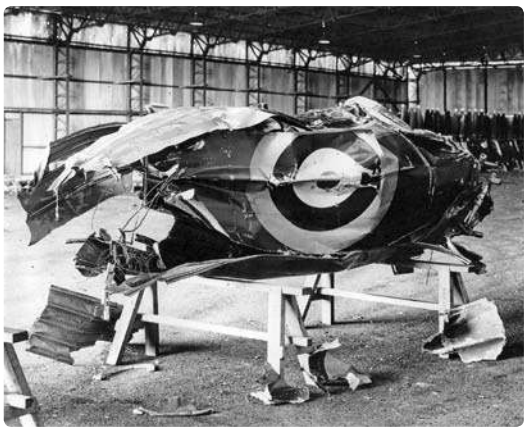
Another mysterious tragedy

Less than two weeks later, on August 11, 1942, R7692 crashed at Thorpe, Surrey. This, however, was no squadron aircraft, but a Typhoon based at Hawker's Langley flight-test centre and flown by experienced Hawker test pilot Kenneth Seth-Smith. The Hawker establishment was shocked to the core according to Charlie Dunne, Seth-Smith's flight engineer, who had despatched the flight.

The purpose of the sortie, as detailed in the accident report, was to investigate level speeds and handling with the top panel of the cockpit canopy removed. No extreme manœuvres, maximum-speed dives or aerobatics were undertaken. The aircraft had already been flown twice that day in normal condition. An eyewitness stated:

"Shortly before the accident happened he had been seen flying at between 2,000ft and 4,000ft, then climbing and turning to port, followed by a rising engine note. Immediately afterwards there was a loud report and the aircraft broke cloud in an inverted spin with engine stopped, until it struck the ground followed by parts of the tail unit."

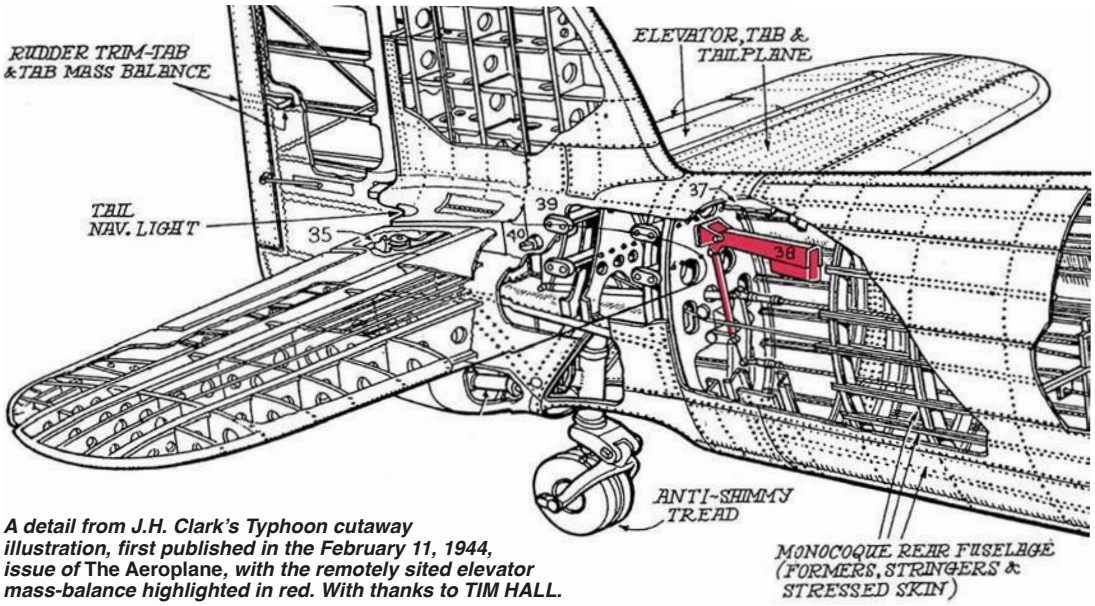
The detailed accident report, which remained



TAH ARCHIVE

a classified document in the files of the Royal Aircraft Establishment (RAE) at Farnborough for decades, came to light when the files were transferred to FAST to be catalogued. A friend there passed the report to me some ten years ago; it was the first time the family became aware that such a report even existed. In its original hand-written form, and with detailed hand-drawn diagrams of the wreckage path and the failed fuselage components, it cast light on the results — but not the cause.

Structural failures at that time were sometimes caused by flutter (see glossary) or distortion, but detailed inspections of Service Typhoons failed to indicate any progressive weakening or distortion of other airframes. The elevator was the primary suspect in the subsequent enquiry. The elevators were balanced by a remotely sited mass, operated through a series of rods connected to a bracket mounted on the bulkhead ahead of the tailplane. Today, the type would almost certainly have been grounded until cause and rectification could be



A detail from J.H. Clark's Typhoon cutaway illustration, first published in the February 11, 1944, issue of* The Aeroplane*, with the remotely sited elevator mass-balance highlighted in red. With thanks to TIM HALL.

established, but "there was a war on" and such action could not be countenanced.

While accidents in new aircraft were not uncommon in squadron service, the loss of a test aircraft flown by an experienced test pilot most certainly was. With alarm bells ringing loudly at Hawker and elsewhere, a top-level meeting was held the day after Seth-Smith's accident, attended by Hawker designer Sydney Camm, his number two Roland "Roy" Chaplin, other Hawker personnel and representatives of every RAE department. That the accidents of July 29 and August 11 were the first mid-air break-ups seems to be confirmed in the later accident report by the mention of a visit on August 15 by two senior RAE personnel to Duxford, where the Typhoon was in service with No 609 Sqn, "following two mid-air structural failures".

According to Philip Lucas, every subsequent unexplained accident had to be referred from squadrons to Langley, with the wreckage being examined there and/or at the RAE. At a meeting on August 28, 1942, ten days after R7644 of No 56 Sqn had crashed under similar circumstances, all parties agreed that strengthening of the transport joint should be undertaken, along with the mass-balance mechanism, as the RAE considered that failure of the latter could cause elevator flutter.

Testing continues

Meanwhile, development and production of the Typhoon continued, the flight-test schedule at Langley being undertaken by Lucas, Bill Humble, Merrick Hymans, John Crosby-Warren and Plt Off Roland Beamont, the latter completing occasional spells as a Hawker test pilot during 1941–43. It can't have been an easy task for the pilots, taking aircraft aloft without any knowledge of the causes of the crash which had killed their colleague.

Glossary Compiled by Matt Bearman

Mass balance A weight attached to an arm intended to damp the movement of a control surface by countering it with inertia

Inertia weight Often fitted near the base of the control column, this mass gives additional resistance to control movements to prevent involuntary overcorrection or excessive feedback through the column from aerodynamically affected control surfaces

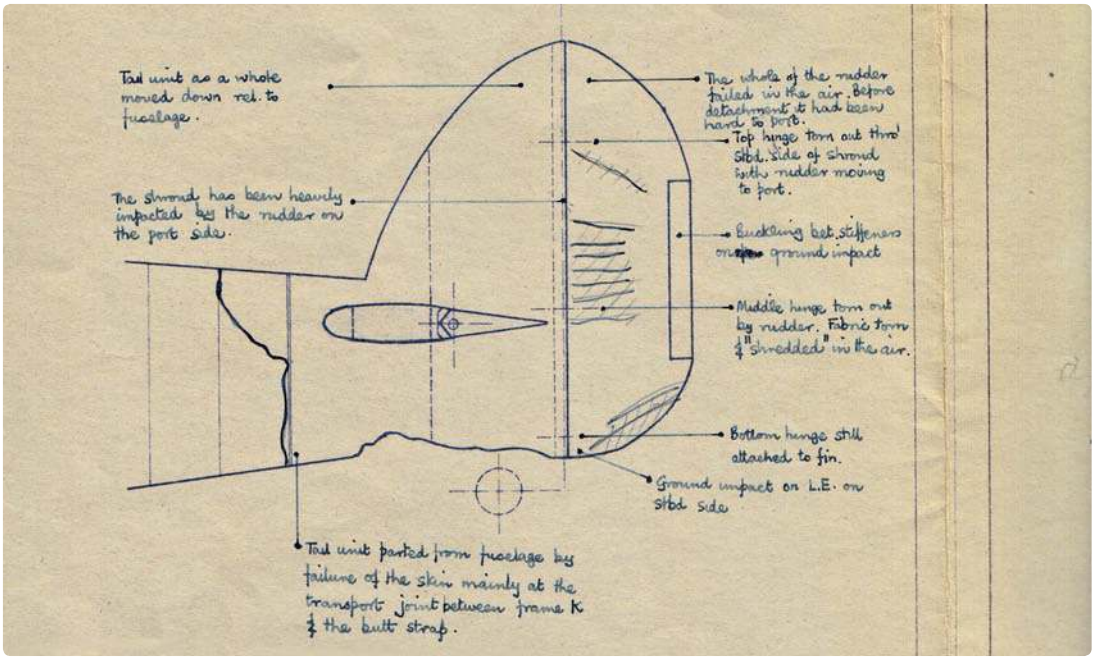
Flutter When a control surface or sometimes a flying surface begins oscillating uncontrollably owing to the alternate action of airflow on upper and lower surfaces

Transport joint A "natural break" in an airframe, held together by fasteners that can be simply removed for dismantling

Natural frequency The frequency of oscillation at which a given object will vibrate with the minimum input of energy, and continue to vibrate after the energy input is removed. Different-shaped objects with varying stiffnesses and mass distributions will all have different natural frequencies

Resonance What happens when an object is encouraged to vibrate at its natural frequency — usually best avoided in engineering. In the case of the Typhoon, it appears that tail flutter alone was not the problem; rather it was aeroelastic flutter hitting a fundamental frequency of the whole system, with stress concentrated in the rear fuselage

Rudder reversal This is usually owing to the "tail wagging the dog" — a large rudder input putting a bending stress on the tail, deflecting it enough for aerodynamic forces to yaw the aircraft the opposite way to that intended. The tail springing back elastically from this state, coupled with sufficient freedom of movement of the rudder, can begin the oscillations leading to flutter



AUTHOR'S COLLECTION

ABOVE ***One of the meticulously hand-drawn illustrations from the official accident report into the crash of R7692, showing the points of structural failure in the rear fuselage. The bottom handwritten caption states that the "tail unit parted from fuselage by failure of the skin mainly at the transport joint between frame K and the butt strap".***

The RAE at Farnborough had already researched various aspects of the Typhoon's design and behaviour. In early 1941 it had investigated the strength of the type's rear fuselage, and later work included windtunnel tests looking into the problems of CO_2 ingress to the cockpit and other aspects of the cockpit design from May 1942, as well as investigating the type's tendency to swing on take-off. The structural failures then started to feature heavily in research work on the type.

The next 18 months saw the issue of more than a dozen reports on work undertaken at Farnborough into the aircraft's structure and behaviour under various flight conditions. This continued in parallel with efforts at Kingston to reinforce the type's rear fuselage in the area of the failures. In his letter, Lucas states that "one of the most intensive accident investigations of the war was mounted by Hawker and the RAE, including some pretty hair-raising flights from Langley specifically to try to find out what happened".

Unfortunately the Hawker design team's efforts to overcome the problem cannot now be fully investigated. On the closure of the Kingston factory in 1992, almost all of the records and all the drawings were scattered or destroyed, although BAE Systems Heritage at Farnborough retains the Master Drawing List of modifications issued at the time, with a very brief description.

In contrast, the RAE's efforts are extremely well documented, with copies of its copious communications with Hawker, the Ministry of Aircraft Production (MAP) and others. Dated less than two weeks after the Seth-Smith accident, SME Test Note 534 gives the results of strength tests on the elevator mass-balance arm in three different directions.

Concern grows

Next came a report by the RAE's Structural & Mechanical Engineering (SME) department on the crashes of R8633 and R7692, dated September 15, 1942, following the discovery of cracks to the tailplane spar-webs of the aircraft. It concludes:

"[The] tailplanes are not working near their margin of strength. The loading under which fatigue failures of spar-flanges develop is not that under which [the] tailplanes failed in flight. Failures of the fuselage at, and in front of, the transport joint preceded any failure of the tailplane. Much of the damage seen to the tailplanes was caused by them being 'towed' by control cables following separation."

Strengthening of the Typhoon's fuselage and tailplane began with Modification (Mod) No 256, issued in late September 1942, simply titled *"Tail Plane — Strengthened"*, which incorporated fixes to ensure no spar-cracking.

By October 23, 1942, SME was developing g-proof in-flight strain-gauges and recorders. At a meeting at the MAP on October 29, attended by Sydney Camm and members of his staff, it is recorded that there was a consensus that "failure of the elevator mass-balance was previously considered the most likely cause of the failures, but it is now generally agreed that this is not the primary cause. Loads caused by rudder reversals [see glossary on page 77] are considered to be



FAST VIA AUTHOR x 2

ABOVE ***A Typhoon model in the high-speed windtunnel at RAE Farnborough. The tunnel was opened in November 1942 and was designed to test scale-models of up to 6ft (1·8m)-span at windspeeds up to 600 m.p.h. (965km/h).***
BELOW ***A contemporary schematic showing the circuit-test details for the elevator's mass-balance system.***

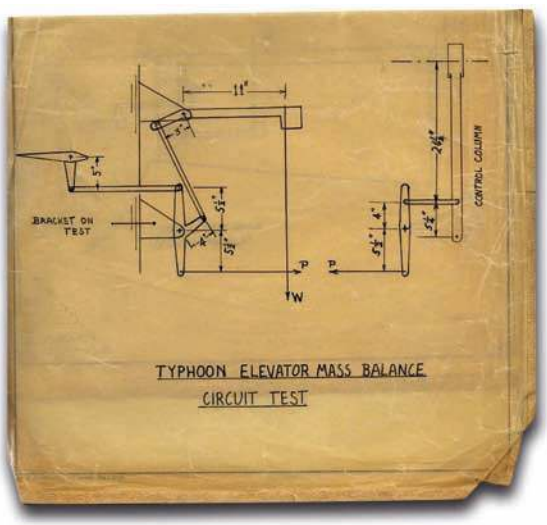
very significant". At this meeting it was also agreed that rubber engine-mountings and a four-bladed propeller should be introduced as soon as possible to minimise the transmission of vibration into the fuselage. In his letter, Lucas confirms that "the elevator mass-balance was quite a well-engineered job and was not suspect[ed] by RAE".

In November 1942, after another loss — R7695 of No 266 Sqn on October 24, involving the loss of its tailplane — a Hawker document was issued advocating further strengthening measures. These were all aimed at the reinforcement of the area around the transport joint and the structure attaching the tailplane. Major investigations then concentrated on the effects of yaw owing to rudder reversal, sideslip and loss of power.

Between October and December 1942 the RAE's Aerodynamics Department produced six reports, all from windtunnel work. Two of these trials used scale models, looking into moments on the tailplane, the remainder being in the 24ft (7·3m) windtunnel using full-size machines. These trials looked at hinge moments on the elevator, yawing-moment measurement, the effect of slipstream on the torsion of the rear fuselage and the effect of slipstream and yaw on the bending moments of the rear fuselage.

The mystery deepens

Meanwhile, the test-flying programme continued apace. The trials aircraft were heavily instrumented, recording readings from the flight instruments as well as the output of strain-gauges fitted to various parts of the empennage.



This instrumentation took up the entire radio compartment so no radio equipment was carried. For that reason, every sortie was carefully planned and rigidly adhered to in case of trouble or failure. Lucas notes in his letter:

"These flight tests didn't show [up] any sign of structural weakness, despite deliberate mishandling under every conceivable flight manœuvre. But we couldn't tell the squadrons that we were completely baffled."

By the end of January 1943 three more Typhoons — DN532 of No 245 Sqn on January 13; R7854 of No 56 Sqn on the 17th and DN364 of No 197 Sqn on the 28th — had been lost owing to tail failure.





ABOVE & RIGHT ***The wreckage of DN510 at Meavy, on the south-west edge of Dartmoor in Devon, after its tailplane failed on February 4, 1943; the only instance of such an accident in which the pilot lived to tell the tale. Note the static balance lever still attached to the bracket on the bulkhead in the photograph at right. In some of the earlier tailplane failures the lever had sheared off from the bracket altogether.*** FAST VIA AUTHOR

Then on February 4, 1943, Typhoon IB DN510 of No 193 Sqn, based at Harrowbeer in Devon, was on a test to height when its tailplane failed. This is the only Typhoon tail separation to have been survived by the pilot, although another survived an in-flight break-up in late 1944, which may have been due to other factors.

The pilot of DN510, Plt Off A.W. Kilpatrick, reported that at about 27,000ft (8,200m) he moved the controls forward and then commenced an aileron turn, but after turning through about 270º he experienced severe buffeting, such as that induced by very bumpy conditions, so took off aileron. At about 380 m.p.h. (610km/h) indicated airspeed (IAS) he then attempted to ease out of the dive, but there was little response, so he immediately throttled back and eased the stick forward slightly, then back without result.

The aircraft then began turning to port, and when an attempt was made to correct this with rudder there was a "terrific bang"; the canopy flew off, some seat-straps failed and Kilpatrick was partly thrown out. He managed to regain his seat, released the other straps and was thrown clear. He pulled his ripcord and alighted on *terra firma* with injuries to scalp, eyes and legs. Eyewitnesses confirmed that the tail had separated, landing half a mile from the main wreckage, which burned out. Kilpatrick had accrued a total of 210 flying hours, four of which were on Typhoons; his clear description of the event confirmed the rapid catastrophic failure of the aircraft — but offered no clues as to the root cause.

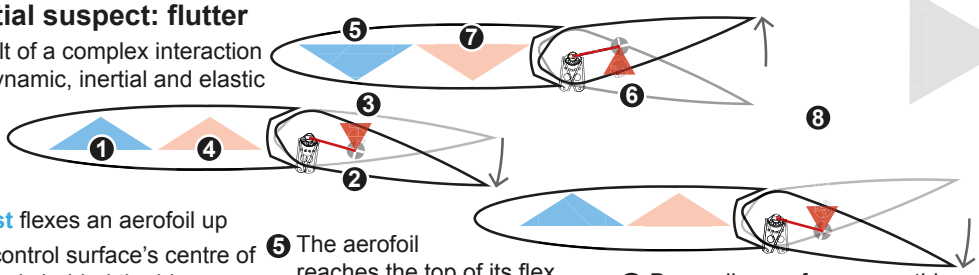
Research continued at Hawker and the RAE, with in-depth examination of every conceivable cause of the Typhoon's tail failures. The next stage was to reinforce further the transport joint during production, and provide a retrofit pack for the squadrons. First mentioned by Camm at a meeting back in November 1942, this involved riveting fillets or "fishplates" to every stringer — all 20 of them — across the transport joint. This modification, Mod No 286, was introduced on February 22, 1943. It would be some time before all delivered aircraft were updated with Mod 286, but even when they were, with all production machines included, the failures continued.

In March, April and May 1943 four aircraft — DN481 of No 609 Sqn; DN265 of No 56 Sqn; EJ932 of No 266 Sqn and EK186 of No 174 Sqn, all fitted to Mod 286 standard — were lost, although at least one of these may have been owing to extraneous factors. What now appeared to be occurring was failure either in front of, or behind, the

Solving the Typhoon's tail problems

The initial suspect: flutter

The result of a complex interaction of aerodynamic, inertial and elastic forces

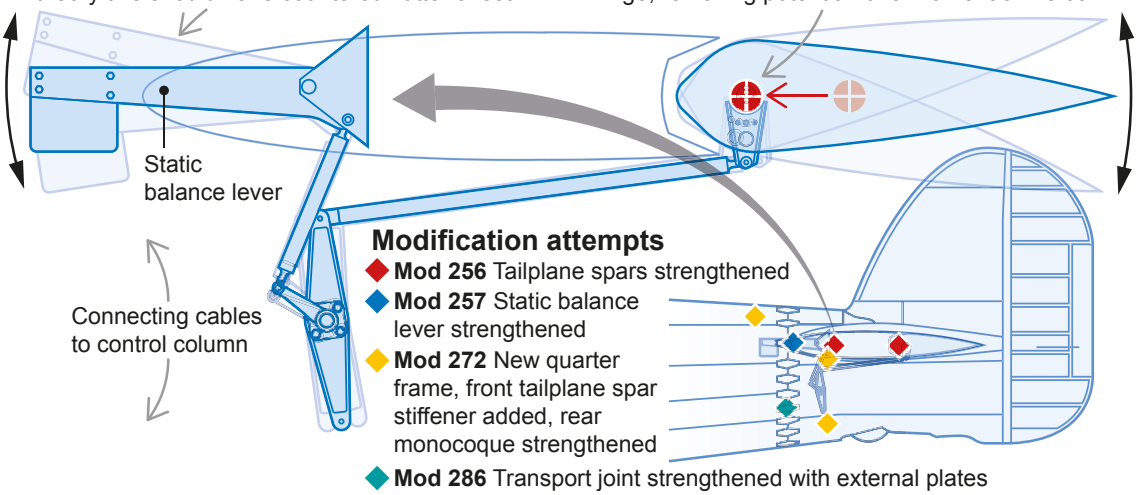


1. A **gust** flexes an aerofoil up
2. The control surface's centre of gravity is behind the hinge …
3. … so a **moment of inertia** causes it to deflect down
4. Increasing lift, adding energy to the wing's upward flex
5. The aerofoil reaches the top of its flex
6. The control surface's inertia keeps it moving upwards …
7. … adding to the subsequent downward flex
8. Depending on frequency, this oscillation can continue or even increase dangerously

Mass balance

The elevator was fitted with a mass balance. In theory this should have countered flutter onset

The balance advanced centre of gravity to the hinge, removing potential for a moment of inertia

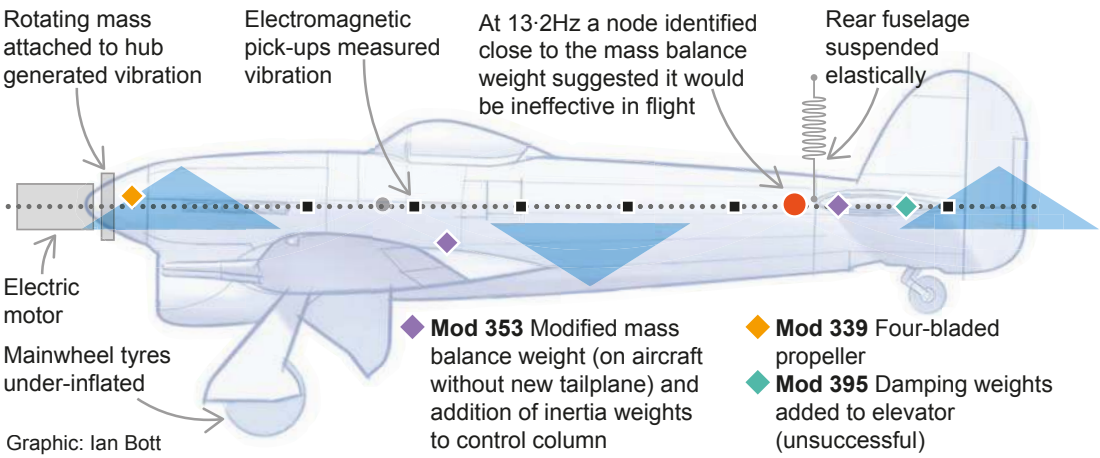


Modification attempts

- **Mod 256** Tailplane spars strengthened
- **Mod 257** Static balance lever strengthened
- **Mod 272** New quarter frame, front tailplane spar stiffener added, rear monocoque strengthened
- **Mod 286** Transport joint strengthened with external plates

The resonance test that discovered the problem

It wasn't just the tail oscillating at a fundamental frequency, it was the whole aircraft



- **Mod 353** Modified mass balance weight (on aircraft without new tailplane) and addition of inertia weights to control column
- **Mod 339** Four-bladed propeller
- **Mod 395** Damping weights added to elevator (unsuccessful)

Graphic: Ian Bott
www.ianbottillustration.co.uk



TAH ARCHIVE

ABOVE ***With the distinctive fishplates added at the transport joint as per Mod 286 clearly visible immediately aft of the serial, the wreckage of EK186 awaits further inspection after having broken up in mid-air near Redhill on May 4, 1943. The cause of these failures continued to mystify the investigation teams at Hawker and the RAE.***

heavily reinforced transport joint, rather than at it.

It had been noted that in almost every failed-tailplane case, a lateral wrinkle had occurred immediately forward of the fin. This was also seen on squadron aircraft, including those which had been fitted with Mod 286. Curiously, despite repeated strength-testing, the RAE never managed to replicate this wrinkling on a test rig.

Further experiments

In early March 1943, Arthur R. Collar, leading SME's activities on the Typhoon at the RAE, visited Hawker to review all activities. It was confirmed that flexible engine-mountings had been approved for future production. This would considerably reduce vibration throughout the airframe. Hawker reported that its strain-gauge measurements had been concluded. Completed using Rotol equipment, these recorded tailplane spar stresses, elevator angle and accelerations at "between 200 and 250 [m.p.h.] ASI" (presumably referring to "airspeed indicated"), while those performed by the RAE had been at 400 m.p.h. The two sets of data generally tallied. The next series of tests, using Smiths recorders, would measure upload, sideload and torsion owing to tail forces.

A modified version of the then-current tailplane, featuring nose-balance weights instead of the remote mass-balance, was flown, but proved unacceptable owing to an adverse effect on longitudinal stability. A new larger tailplane was tested on the second Typhoon prototype, P5216, incorporating a 13 per cent increase in area and demonstrating improved longitudinal stability. It reduced the tendency for the type to tighten up in a turn; and, as this was to be a standard fitting for Hawker's next fighter development, the Tempest, it was felt that commonisation with the Typhoon would be beneficial. Furthermore, an improved high-speed aerofoil section could remove some undesirable elevator characteristics which had occurred during the high-speed windtunnel tests. A request was made to repeat these tests with the larger tailplane if they were not already envisaged for the Tempest programme.

When 21 leading lights from Hawker (including Camm, Chaplin and Bill Humble), the RAE's Accident Investigations Branch and "interested" government departments met at the MAP on May 15, 1943, there had been a total of 12 Typhoon tail-related accidents, all but one fatal. Hawker and the RAE were little further ahead as to why, although numerous avenues had been investigated and proven not to be the main cause. To make matters all the more baffling, the aircraft involved in the last four accidents incorporated the latest strengthening modification.

There seemed to be few common factors. Although in the latter cases there had been wing failures, these were generally deemed to be in download and occurring after the primary failure of the rear fuselage. Flying hours relating to the machines involved varied widely, both of pilots and airframes. So did the speeds and altitudes at which the failures had occurred. While there had been a host of investigations into yaw characteristics — particularly when the engine cut (often in negative g) and immediate restart caused a reversal — there was no evidence in any accident of this happening.

Rudders and elevators did not appear to have been subject to rapid oscillation either, although

"All terribly worrying . . ."

IN A LETTER dated February 29, 1976, former Hawker test pilot Philip Lucas (**RIGHT**) replied to former Gloster test pilot John Grierson, who had written to Lucas expressing concern that Kenneth Seth-Smith's contribution to the Typhoon's early development had not been fully acknowledged in Arthur Reed and Roland Beamont's book *Typhoon and Tempest At War* (Ian Allan, 1974). Excerpts from the letter, a copy of which is now in the author's possession, are reproduced below.



TAH ARCHIVE

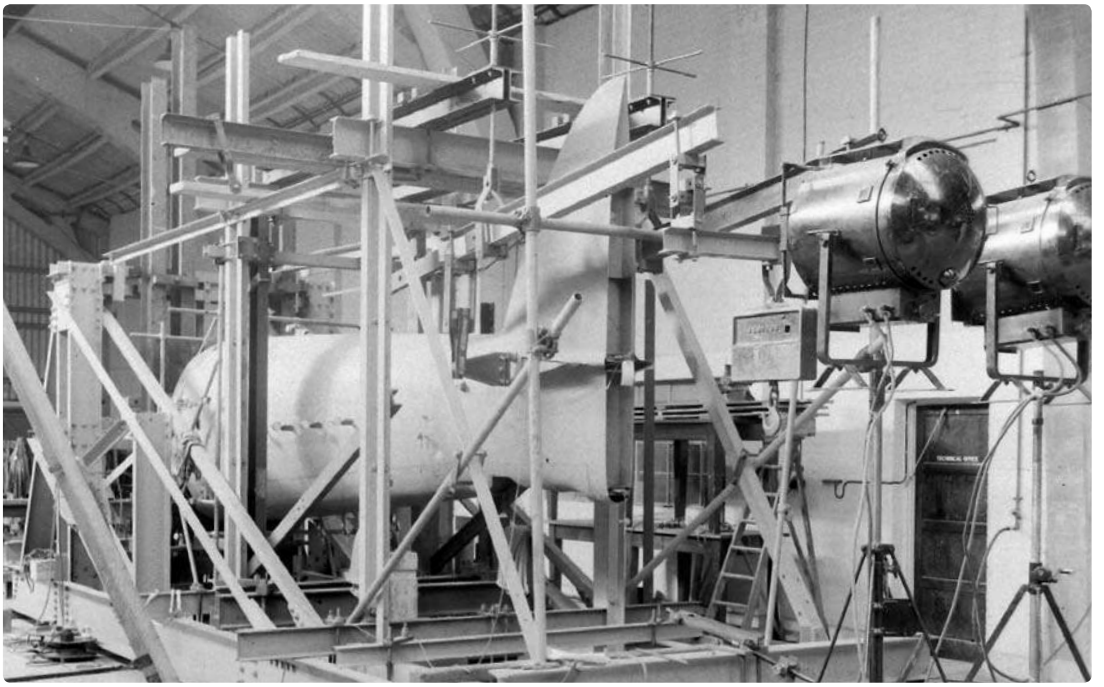
"ALTHOUGH KEN was killed in a Typhoon by the tail unit breaking off, it wasn't until a little while after his death and after many more Typhoons were in service, and consequently more Typhoons involved, that perhaps one of the most intensive accident investigations of the war was mounted by both Hawker and the RAE, which included some pretty hair-raising flight tests at Langley, specifically to try and find out what happened.

Most of this particular flight testing was done by Bill Humble, Merrick Hymans and myself with 'B' [Roland Beamont] playing a fairly small part whilst he was attached to me — not that I am belittling what he did.

As a matter of interest and because of the enormous amount of special instrumentation, which included simultaneous readings of both flight instruments and 'strain gauges' attached to various parts of the empennage and rear end of the fuselage, we designed and installed what I believe was the first automatic camera recorder. In the book *[Typhoon and Tempest]* it said, 'unbelievably we did not carry radio,' but we couldn't, for the equipment took up the whole of the radio compartment. That is why each test was carefully planned and the sequence of tests rigidly adhered to, there being no 'black boxes' at that period of time. I believe too that it was the first time strain gauges had been used in flight.

We had about 28 tail-failures with no survivors. Every crash was recovered and carefully investigated by both Kingston and Farnborough. In each case the whole boxed tail unit broke off just forward of the transport joint, but in each case there was no evidence of buckling or skin-wrinkling, nor anything to connect it with elevator flutter, which of course was the first thing to be suspect. The mass-balance was . . . quite a well-engineered job and not suspect[ed] by RAE. Nor did the flight tests show any sign of structural weakness despite deliberate mishandling under every conceivable flight manœuvre. Nevertheless we introduced quite a few strengthening mods, purely to show that the matter was being taken seriously, but obviously we could not tell the squadrons that we were completely baffled. The surprising thing was the high morale within the squadrons. All terribly worrying because with D-Day within sight, there could be no question of grounding the squadrons.

All the Service engineers were supplied by Langley and each had written instruction from me to report to me personally any incident which might throw some light on the trouble, and it is quite true that the first clue we received was a telephone call from our engineer at Hurn late one night, that a Sergeant Pilot had just complained to him that he had experienced something odd. I told him to ground the aeroplane until I arrived next morning. We interviewed the pilot, who was slightly incoherent or rather inarticulate, and inspected the aeroplane, but could find nothing unusual, so I then flew it with the same result. Nevertheless, we had it dismantled and transported to Farnborough. RAE assembled it again and mechanically vibrated the whole aircraft to find its natural frequencies. All this happened so long ago, but I believe that this was one of the first aircraft to be subjected to this sort of test, although it became common practice during the latter part of the war. Farnborough established a 'node' in the rear end of the fuselage adjacent to the location of the elevator mass-balance, which under certain conditions of flight, set up the forces which broke the fuselage. We altered the weight of the elevator mass-balance by a mere matter of 2lb, and as far as I know we never had another tail failure."



FAST VIA AUTHOR

ABOVE ***The rear section of a Typhoon fuselage undergoing testing at RAE Farnborough. The rear fuselage was initially beefed-up with Mod 256, the fitting of an external steel band around the transport joint; the introduction of Mod 286 (fishplates and internal stiffening) was reckoned to increase the joint strength by another 20 per cent.***

the rudder was frequently found to have moved past its maximum deflection in many cases. Item 2.8 in the minutes states: "Side-loading appears mainly to have caused the fuselage failures in the last four cases, but the primary cause of the accidents is not clear". This was the essence of what Lucas wrote to Grierson all those years later.

Further investigations into yaw in all stages of flight and the effects of compressibility were agreed upon; in the latter case the possibility of a compressibility-stall of the fin, with consequent rapid yaw, and pressure measurement to check for shock-stall at the wing root, were to be made by Hawker. Six weeks later, a similar meeting at Hawker agreed that comprehensive flight trials by the manufacturer and the RAE had not revealed any tailplane loads which could cause fuselage failure.

Progress — and some red herrings

A further strand of the enquiry was opened when aerodynamics specialist Dr Eastman Jacobs of the USA's National Advisory Committee for Aeronautics (NACA) visited Hawker at Claremont on August 11, 1943, to talk to the design team, before going on to Langley to discuss flight experiences. Lucas, Humble and Beamont recounted experiences of pitch and roll instability in high-speed dives up to Mach 0·74 (after which the aircraft would not accelerate) at altitude, during which vapour would form over the wing roots during nose-down oscillation. This was due to compressibility stall and the breakaway of downwash over the tailplane. Jacobs recommended further high-speed tests at altitude and opined that the sudden change in downwash at the point of compressibility stall was the most probable cause of the accidents.

Jacobs's views were again discussed during a review meeting at the RAE on August 18, but the fact that almost all the relevant accidents had been at comparatively low level — below 10,000ft (3,000m) — and at low Mach numbers, seemed to render this view very unlikely. It was also pointed out that to explain failures at or near the transport joint but not at the forward part of the fuselage would require a vertical acceleration of about 40g.

Service engineers were supplied from Langley, and had a written instruction from Lucas to report to him immediately any incident which might throw light on the problem. According to the letter Lucas later sent to Grierson, in the spring or early summer of 1943 Lucas received a late-night call from an engineer at Hurn that a Sergeant Pilot had reported something odd. Lucas ordered that the aircraft be grounded. At Hurn the next morning Lucas "found the pilot slightly incoherent" and after an inspection found nothing unusual. Lucas continues, "I then flew [the aircraft] with the same result [as usual, i.e nothing untoward]. Nevertheless we had the aircraft dismantled and transported to Farnborough. RAE assembled it again and *mechanically vibrated the whole aircraft to find its natural frequencies*" (Author's italics).

This marked the beginning of the end of the problem, as the RAE then began an extensive



TAH ARCHIVE

ABOVE ***A characteristically splendid portrait of Typhoon IB JP682 (with serial blanked off) by renowned aviation photographer Charles E. Brown. By early 1944, with the Allied invasion of occupied Europe imminent, it was imperative that the various modifications to the Typhoon maximised pilots' confidence in it as a fighting machine.***

resonance-test programme on the type. The tests to which Lucas refers in his letter started sometime in the summer. During August 1943 Collar issued Technical Note SME 179, *"Interim Note of Typhoon Elevator Flutter"*, the lead-in summary of which states the following:

"[This] paper contains an analysis of resonance tests on a Typhoon made to determine the mode of fuselage-bending entering into symmetrical elevator flutter. The analysis yields, also the relevant stiffness calculations based on the analysis show that, with the present remote mass-balance system, there remains a significant inertia coupling between the elevator and fuselage motions, and that an additional mass-balance is necessary for the avoidance of elevator flutter".

This interim report, which runs to 13 pages, details the interpreting of the resonance tests, Section 9.2 offering:

"With the present system and mass-balance, flutter sets in at about 400 m.p.h. [640km/h] EAS [equivalent air speed], the frequency being 8·9Hz, and dies out again at 700 m.p.h. [1,130km/h]. Flutter is absent if the present mass-balance is increased by 4¾lb [2·2kg] (with a rigid linkage) or 3¼lb [1·5kg] (with a flexible linkage)".

Section 9.4 continues:

"For the existing system, the most rapid growth of flutter above the critical speed occurs at about 500 m.p.h [800km/h]". These interpretations were of course derived entirely from resonance-test material and theoretical calculation. This work also covered theoretical weights for an elevator-nose-mounted mass-balance, but stability problems with such a system were already becoming known.

The smoking gun?

A full report, entitled *"Resonance Tests of a Typhoon Aeroplane"*, was issued as SME 197 in November 1943. The methodology for the test involved the elastic suspension of a complete airframe, which rested on its mainwheels with tyres very soft, the rear fuselage being suspended elastically, the whole being in horizontal flight attitude.

A Mullard electromagnetic pick-up worked on the seismic principle, the outer case being held firmly against the vibrating station. An internal mass, spring-controlled and suitably damped, remains almost stationary in space when the unit is subjected to high-frequency vibration. The relative movement between the mass and the case generates a small voltage which is amplified and fed to an oscillograph, appearing on the screen as a wave trace. Thus, vibration readings may be taken at stations on the fuselage centreline and on the front and rear wing-spars.

The airframe was vibrated by a simple rotating mass with adjustable degrees of imbalance and was mounted to give a simple harmonic force having vertical and horizontal components. The unit was clamped to the hydromatic gear unit in the propeller hub and was driven by a variable-speed electric motor. The applied force was small, less than would have been required if mechanical recording had been used.

Typhoon propeller & tailplane Mods, September 1944

ON SEPTEMBER 25, 1944, a memorandum was issued clarifying the state of Typhoon mods as follows:

Propeller	Tailplane	Inertia weight	Mass balance	Relevant Mods	Remarks
Three-bladed	Original	—	6lb (2·7kg)	—	Original
Three-bladed	Original	16lb (7·25kg)	8lb (3·6kg)	Mod No 353	Current
Three-bladed	Large	16lb (7·25kg)	6lb (2·7kg)	Mods Nos 354 & 395	Current
Four-bladed	Large	16lb (7·25kg)	6lb (2·7kg)	Mods Nos 339 & 354	All present production aircraft

The frequency range providing data for flutter calculations was 0–18Hz. There were two major resonances at 9·3Hz and 13·2Hz. At 9·3Hz the nose and tail of the aircraft were moving up, the outer wings were moving down, while the centre section remained almost still. At 13·2Hz the nose, tail and wings were moving upwards while the centre section moved downwards. The node at 13·2Hz, just forward of the elevator mass-balance in the static test, implied that in flight the mass-balance weight would be largely ineffective. Furthermore, when in flight the wing motion was strongly damped, the node would move fore and aft. As Lucas said more than 30 years later in his letter: "Farnborough established a 'node' in the rear end of the fuselage adjacent to the location of the elevator mass-balance, which, under certain conditions of flight, set up the forces which broke the fuselage".

This was the information which had been sought for a year, and which in due course led to alterations to the mass-balance weight and the addition of an inertia-weight at the base of the control column. Arriving at these modifications was by no means swift, however, as the information had to be extensively checked and test-flown, arriving as it did in the midst of a number of other modifications to the tailplane, including standardisation of the larger unit and the introduction of a four-bladed propeller.

Mod 353: the "key fix"

The squadrons still had to deal with the ongoing maintenance problems thrown up by this host of changes, some 2,400 Typhoons having been delivered by this time. Dated January 6, 1944, Mod 353, *"Elevator Mass Balance Modified & Inertia Weight Introduced"*, was the "key fix", calling for an inertia-weight of 16lb (7·25kg) at the control-column base and a mass balance of 8lb (3·6kg).

On February 9, 1944, the new, larger tailplane was introduced (for which the mass-balance weight was reduced), while the four-bladed propeller was increasingly becoming available. Another modification, Mod 395, became available from April 29 to "stabilise the tailplane" further. This involved adding weights to the nose of the elevators on the large tailplane, when used in conjunction with a three-bladed propeller. Then in early June changes were made to improve the interchangeability of tailplanes (see panel above).

That lot must have been more than enough to tax the resources of the Maintenance Units, let alone the squadron engineers and fitters! And all this was being done while a ferocious battle was raging through western Europe, with Typhoon squadrons constantly on call to support armour and infantry and destroy communications.

In his letter to John Grierson more than 30 years later, Philip Lucas wrote that there were no more accidents after the modifications were made. He was right insofar as accidents attributed to tail-failure for the reasons unearthed by the RAE ceased; but, until the Typhoon's frontline service career ended, squadron aircraft were subjected to extremely harsh treatment in combat and there were further structural failures, generally attributed to unrepaired combat damage or heavy overstressing by the pilots, often when carrying full loads of bombs and/or rocket projectiles.

A letter dated June 14, 1944, from Mr R. Hain Taylor, on behalf of the Director of the RAE (Sir William Farren), to the Air Officer Commanding, Bentley Priory, concerning a Typhoon at Holmsley South which had suffered skin distortion to the wings, is enlightening: "The trace for this aircraft . . . shows heavy pull-outs, the most pronounced of which is 8 to 8·25g at around 450 m.p.h. [725km/h]. Others peak at 7·25g at 420 m.p.h. [670km/h] and 7g at 360 m.p.h. [580km/h]. It is understood that an aircraft had been inspected which had deep buckles at the change of dihedral, our representative being informed that the wing commander 'regularly buckles his wings on operational flying'". Figures relating to Typhoon MN141 show one isolated peak of 10·25g at 460 m.p.h. (740km/h). There is no reply on the file!

The Typhoon would not have proved to be such a potent weapon, nor formed the basis of the mighty Tempest and Fury/Sea Fury — arguably the finest single-piston-engined fighter of all — without the extraordinary skill and perseverance of those at the RAE in support of the Hawker design team led by Sydney Camm.

ACKNOWLEDGMENTS *The author would like to thank Graham Rood and the volunteer staff at the Farnborough Air Sciences Trust (www.airsciences.org.uk), Royal Air Force Museum Hendon library staff and BAE Systems Heritage, and the Editor thanks Tim Hall and Matt Bearman for their invaluable assistance with the preparation of this article*

WARPAINT BOOKS



All major credit cards accepted. Orders can be placed by mail, telephone, fax or through the website. (www.guidelinepublications.co.uk) Plus postage and packing on all orders. Overseas readers pay postage at air mail printed paper rate.

WHAT'S IN A WARPAINT BOOK?

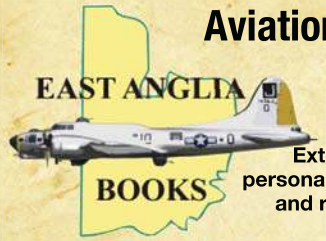
- COMPLETE AND DETAILED HISTORY
- AIRCRAFT IN DETAIL PHOTOS
- AIRCRAFT COLOUR AND CAMOUFLAGE DRAWINGS
- AIRCRAFT COMPLETE PRODUCTION LISTS
- INDIVIDUAL AIRCRAFT, UNITS, SQUADRONS, SERIALS & CODES
- AIRCRAFT COMPREHENSIVE SPECIFICATIONS

1	Bristol Beaufighter	£10.50	33	Heinkel He 177	£9.95	65	Westland Wessex	£14.50	97	North American RA-5C Vigilante	£15.50
2	Blackburn Buccaneer	£11.00	34	Avro Lincoln	£13.50	66	Bristol Bulldog	£10.50	98	Avro York	£15.00
3	Junkers Ju 87 Stuka	£11.00	35	Fairey Barracuda	£12.50	67	Folland Gnat and Ajeet	£11.00	99	McDonnell Demon	£15.00
4	North American F-100 Super Sabre	£11.00	36	Handley Page Victor	£14.00	68	Bristol Brigand	£11.00	100	Republic F-84F and RF-84F	£17.50
5	Hawker Typhoon	£11.00	37	Gloster Gladiator	£14.50	69	Martin B-26 Marauder	£12.00	101	de Havilland D.H.82 Tiger Moth	£14.50
6	Avro Shackleton	£11.50	38	Republic F-105 Thunderchief	£13.00	70	Vought Corsair	£16.00	102	Convair B-36	£15.00
7	Junkers Ju 88	£11.00	39	Supermarine Walrus	£10.50	71	Armstrong Whitworth 650/660 Argosy	£12.00	103	Avro Manchester	£13.00
8	Hawker Hunter	£15.00	40	Canadair/Commonwealth Sabre	£14.00	72	Vickers Supermarine Merlin Seafire	£12.00	104	General Dynamics F-111 & EF-111A	£19.00
9	Grumman F4F Wildcat/Martlet	£11.00	41	Fairey Fulmar	£12.50	73	North American B-25 Mitchell	£12.50	105	Sopwith Pup	£13.00
10	Vickers Wellington	£11.00	42	Boulton Paul Defiant	£10.50	74	Hawker Siddeley Harrier	£14.50	106	Sikorsky S-55/H-19 & Westland Whirlwind	£16.50
11	de Havilland Sea Vixen	£11.00	43	Lockheed F-104 Starfighter	£15.50	75	BAe Sea Harrier	£12.50	107	Ilyushin IL-2 'Sturmovik'	£14.00
12	Fairey Swordfish	£12.50	44	de Havilland Venom	£13.00	76	Grumman Tracker/Trader/Tracer	£14.50	108	Martin Mariner & Martin	£15.50
13	Focke-Wulf Fw 200 Condor	£11.50	45	Martin B-57 Canberra	£13.50	77	Curtiss P-40	£12.50	109	Douglas C-54/R5D Skymaster & DC-4	£19.50
14	BAC Lightning	£16.00	46	Handley Page Halifax	£15.00	78	Aer Macchi C.202-205 Folgore-Veltro	£12.50	110	Westland Scout & Wasp	£15.00
15	Short Stirling	£11.50	47	McDonnell F-101 Voodoo	£13.00	79	Consolidated PBY Catalina	£15.00	111	Vought OS2U Kingfisher	£14.50
16	Hawker Sea Fury	£10.50	48	Westland Lysander	£12.50	80	Saab Draken	£14.50	112	Douglas A3D Skywarrior	£19.00
17	Gloster Javelin	£12.00	49	Fiat G.91	£12.50	81	Junkers Ju 52	£12.00	113	Panavia Tornado ADV	£16.00
18	Douglas Skyraider	£11.50	50	Bristol Beaufort	£12.50	82	BAC Jet Provost	£14.50	114	McDonnell F4 Phantom	£24.00
19	de Havilland Hornet and Sea Hornet	£11.50	51	Lockheed Neptune	£13.50	83	Fairey Battle	£15.00	115	Armstrong Whitworth Albemarle	£13.00
20	Supermarine Seafire (Griffon engine)	£12.50	52	Fairey Albacore	£12.50	84	Grumman F6F Hellcat	£15.50	116	Hawker Fury and Nimrod	£16.00
21	Armstrong Whitworth Whitley	£12.00	53	Avro Anson	£13.50	85	Supermarine Scimitar	£13.00	117	Douglas F4D/F-6 Skyray & F5D Skylancer	£14.00
22	Gloster Meteor	£18.00	54	Westland Whirlwind F.Mk I	£10.50	86	Vickers Wellesley	£13.00	118	NAA B-45 Tornado	£15.00
23	Fairey Gannet	£13.00	55	Hawker Tempest	£12.00	87	Grumman Avenger	£16.00			
24	Domier Do 217	£12.00	56	Blackburn Firebrand	£12.00	88	Lockheed T-33A	£13.00			
25	Short Sunderland	£12.00	57	Handley Page Hampden	£12.00	89	Avro Lancaster	£15.50			
26	Bristol Blenheim	£12.50	58	Supermarine Swift	£12.00	90	Boeing B-17	£16.00			
27	de Havilland Vampire	£17.50	59	Lockheed Hudson	£12.00	91	Mikoyan-Gurevich MiG-21 'Fishbed'	£25.00			
28	Fairey Firefly	£15.00	60	English Electric Canberra	£17.50	92	Grumman HU-16 Albatross	£14.50		Warpaint Specials	
29	Hawker Sea Hawk	£12.50	61	Savoia Marchetti S.79 Sparviero	£12.00	93	Messerschmitt Me 262	£13.00	No.1	Republic P-47 Thunderbolt	£20.00
30	Avro Vulcan	£13.50	62	Handley Page Hastings	£12.00	94	Supermarine Attacker	£13.00	No.2	Messerschmitt Bf 109	£18.50
31	RAF/RN Phantoms	£14.50	63	Vickers Valiant	£11.50	95	Westland Sea King	£16.00	No.3	de Havilland Mosquito	£17.50
32	Douglas A-20 Boston/Havoc	£14.50	64	Convair F-102	£13.00	96	Consolidated B-24 Liberator	£25.00	No.4	Cessna Bird Dog	£11.99

For more information and secure ordering please visit: www.guidelinepublications.co.uk

Guideline Publications, 6 Kensworth Gate, 200 204 High Street South, Dunstable, Beds LU6 3HS
Telephone: +44 (0)1582 668411, Email: kim@guidelinepublications.co.uk

EAST ANGLIA BOOKS



Aviation and Military Books for the Historian – Collector – Enthusiast

Trading for over 37 years!

Extensive range of USAAF, RAF and other Air Force unit histories, plus personal stories, operations, airfields, details of individual aircraft types, wrecks and relics, military history and vehicles, nose art and aviation art, clothing, medals and insignia, modelling . . . and much more!

LOSSES OF THE US 8th AND 9th AIR FORCES Volume 6, 1st Jan to 31st March 1945 *by Stan Bishop, J A Hey, G Franken, M Cillessen.* Hdbk, d/jckt, approx 600pp, illustrated. Next volume in this highly acclaimed series, coming soon! (Volumes 3 and 5 currently available) **tba**

WITH HIS CAMERA AT THE FRONT *by Axel Urbanke:* Collection of colour slides from the estate of a former war reporter who accompanied JG 77 from the Channel in 1941 through the Balkans to Russia. Hdbk, d/jckt, 240pp, 54 colour & 170 b/w photos, 13 colour profiles. Out Now! **£59.95**

NAA B-45 TORNADO (Warpaint Series 118) *by Kev Darling.* A4 size softback, superb illustrations by Richard J Caruana, scale plans, detailed history, production list, specifications, etc **£15.00**

RAF MARHAM Operational History 1916 to 2019 *by Ken Delve.* The end of service of the Tornado at Marham in 2019 opened a new chapter for the Norfolk base, as home to the F-35B Lightning. Hdbk, colour throughout, approx 270pp. **£30.00**



THE HAWKER TEMPEST (Airframe & Miniature 4), Updated & Expanded Edition *by Richard A Franks.* Includes walkaround images, technical diagrams, modelling info, photos, etc. 160pp. **£18.95**

LUFTWAFFE IM FOCUS Vol 28 (Vols 18 to 28 available) – this volume has 50 pages, 54 photos, 4 in colour, 4 colour profiles, 2 coloured emblems and 3 coloured maps, A4 size, stapled softback. **£25.00**

Please contact us for a FREE copy of our catalogue!

(Prices are plus postage & packing — all our books are packed carefully by hand.)

PO Box 12408, Stansted, Essex, CM24 8UZ, ENGLAND
Telephone +44 (0) 1279 813791 E-mail sales@eastangliabooks.com
Website www.eastangliabooks.com Facebook www.facebook.com/eastangliabooks

Rogues' Gallery

The decidedly murky history of

BAHAMAS WORLD AIRLINES

Most airlines operate on a notoriously fine line between success and failure, the twin demands of financial probity and profitability often appearing to be mutually exclusive. Bahamas World Airlines never achieved either throughout its dubious history, quickly becoming a cash-cow for some extremely unsavoury characters, as **MAURICE WICKSTEAD** reveals

LIKE ALL COMMERCIAL enterprises, the airline industry has seen its fair share of chancers, swindlers and disreputable characters. While many operators often found it necessary to "sail close to the wind" just to survive, some, like convicted arms-smuggler Viktor Bout, have used airlines as cover for downright criminal activities. One such company with a highly dubious history is Bahamas World Airlines (BWA), a short-lived carrier that became mired in the graft and corruption that became endemic in the islands in the 1970s.

The Swire Group affair

Bahamas World Airlines was originally established in 1968 with a view to creating a truly Bahamian-owned and -operated airline to help develop the islands' tourist trade. The territory's existing carrier, Bahamas Airways Ltd (BAL), was being stifled by generous concessions to American carriers, its services only accounting for around 13 per cent of the lucrative Nassau—Florida market.

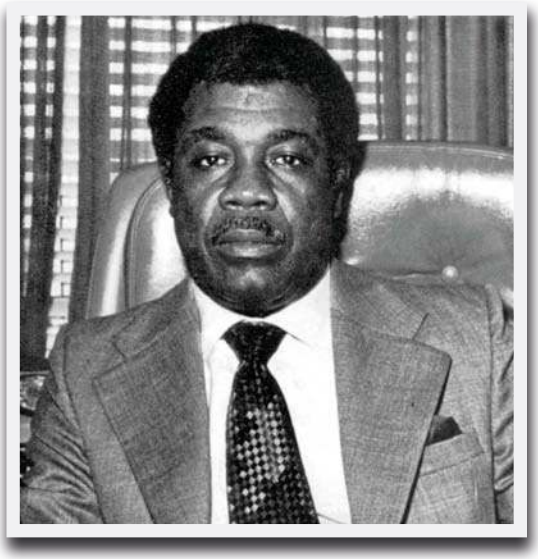
Since the early 1950s BAL had been one of BOAC's Associated Companies, but the Corporation was looking to offload its loss-making subsidiary. The opportunity came in October 1968 when the Swire Group, owners of Cathay Pacific Airways, agreed to take a controlling 85 per cent interest in the ailing airline. The Group was encouraged to believe that it had government backing to turn BAL into a viable flag-carrier for the Bahamas. However, from the cigarette-smoke-filled chambers of power a different story emerged, and Swire was to be double-crossed.

The granting of internal self-government to the Bahamas by the UK in 1964 gave legitimacy to an adminstration backed by the "Bay Street Boys" (after Nassau's main street), an influential group of white self-enriching businessmen that controlled Bahamian commerce and industry. The Bahamas had already become a repository for fake insurance schemes, dirty money and, since being thrown out of Castro's Cuba, Mob-controlled casinos. Worse was to come.

This unhealthy situation appeared to be headed in a better direction with the ascendancy of Lynden Pindling's Progressive Liberal Party (PLP), which campaigned to rid the Bahamas of these corrupt enterprises and improve the fortunes of the underprivileged majority of black citizens. The PLP came to power in 1967 and oversaw independence in 1973 — and would ultimately preside over criminality on an even grander scale.

Bahamas World Airlines was the brainchild of Everette Bannister Jr, a Bahamian whose family had migrated to the USA in the 1940s and who was subsequently granted American citizenship. Little is known of his time in America, other than that he occasionally worked as a doorman in Manhattan, where no doubt he made many useful contacts that would subsequently stand him in good stead in his future dealings.

After his return to the Bahamas in 1966 he registered Bahamas World Transport in March



LEFT ***Everette Bannister Jr was born in Marsh Harbour in the Bahamas, but acquired American citizenship in 1951. He returned to the Bahamas in 1966 and ultimately funnelled more money in "gifts and loans" to Prime Minister Lynden Pindling's accounts than any other individual. Bannister also succeeded in relieving American fugitive Robert Vesco, who played a part in the BWA story, of much of his stolen fortune.*** VIA AUTHOR

1968 as a susidiary of BW Holdings, which also included ownership of Nassau's Anchorage Hotel. He was initially assisted by Murray Vidockler, a well-known figure in the travel industry and a director of Caledonian Airways. Little progress was made over the next few years, but Bannister had an ace up his sleeve — he was an old chum of Prime Minister Pindling, whose administration was keen to see the creation of an "all-black" flag-carrier.

Pindling reneged on the deal with the Swire Group and ordered the transfer of key routes to BWA, even though it was still only a "paper airline". It was largely a pointless exercise, however, as BWA would need approval of the USA's Civil Aeronautics Board (CAB) to operate into the USA; it was unlikely to be forthcoming.

The Swire Group had invested heavily in BAL and introduced a fleet of BAC One-Eleven jetliners to improve key services to Florida. The Group had also offered the Pindling government a 51 per cent holding in the airline, which was declined. Faced with a *fait accompli*, the Swire Group pulled out and closed down BAL on October 9, 1970, suffering a reported loss of US$25 million. This left the Bahamas without an overseas airline. Another devious scheme was already brewing — the creation of Bahamasair.

Bahamas World airborne

In December 1971 Bannister eventually got his airline off the ground following the delivery of Boeing 707-138B VP-BDE, leased from International Aerodyne. On its maiden flight for BWA in January 1973 the aircraft brought a party of European property developers to explore prospects in the islands. A planned technical and managerial arrangement with TWA fell through, maintenance apparently being handled by Braniff and later Aer Lingus instead, while early flight crews reportedly came from British Caledonian Airways (as it had become in 1971).

A dispute over landing rights at Frankfurt in Germany seems to have stalled BWA's intention to begin inclusive tour charters to and from Europe. Thus over the next couple of years there was little activity apart from a few *pro-rata* charters between the USA and Nassau, and a twice-weekly wet-lease (provision of aircraft and crew) run between Brussels and St Lucia in the Windward Islands for International Air Bahama, established in 1966 by British businessman



Bahamas World Airlines' first aircraft was Boeing 707 VP-BDE (c/n 17700), formerly Qantas's VH-EBE* City of Perth. *After stints with Standard Airways, Pacific Western Airlines and Alaska Airlines, it joined BWA in November 1971, remaining with the airline until August 1974, when it was acquired by National Aircraft Leasing. It is seen here at Nassau with the airline's distinctive dolphin logo in January 1972.

JACQUES GUILLEM COLLECTION VIA TOM SINGFIELD



BRIAN STAINER VIA MIKE HOOKS COLLECTION

ABOVE ***Established in 1966 to operate budget transatlantic services between the Bahamas and Luxembourg via the USA, International Air Bahama leased 707-355 N525EJ (c/n 19417) from July 1968 to October 1969. Also no stranger to controversy, IAB was acquired in 1969 by Loftleidir, which leased DC-8s for IAB's transatlantic routes.***

Norman Ricketts to operate budget transatlantic services between the Bahamas and Europe via the USA.

Following the resolution of traffic-rights difficulties, BWA was finally able to begin twice-weekly charters from Europe on May 31, 1973. Sitting idle at Brussels during the week, 707 VP-BDE, by this time named *Spirit of '73* (in honour of the Bahamas becoming an independent Commonwealth realm in 1973), would depart for Freeport and Nassau every Saturday, with a fuel stop at Gander in Newfoundland or occasionally Santa Maria in the Azores. A fresh crew then completed a second transatlantic round-trip before the aircraft headed back to Brussels, where it would park up again until the following weekend. Most of the crews were from Lloyd International and British Eagle, augmented by Bahamian first officers and local stewardesses plus a couple of German girls.

The idea was to bring European tourists to the Bahamas on week- or fortnight-long package tours, but in the event it proved more popular with American holidaymakers as a cheaper way of crossing the Atlantic, avoiding the restrictions of regular "affinity group" charters (groups or clubs that qualified for cheap transatlantic fares).

By all accounts BWA's aircraft were seldom full — hardly a recipe for profitable operations. There was already well-established competition from International Air Bahama, which had become a non-IATA subsidiary of Icelandic airline Loftleidir in 1969.

Enter Robert Vesco

In mid-1972 Robert L. Vesco fetched up in the Bahamas, seeking a safe haven from various American government agencies keen to talk to him about the alleged embezzlement of $224m and a questionable $250,000 donation to Richard Nixon's Committee for the Re-election of the President (given the apposite acronym CREEP), made to avoid the USA's Securities & Exchange Commission probing too deeply into his affairs. It has been widely reported that Vesco's donation was used to fund the Watergate burglary, which eventually toppled Nixon.

A streetwise New Jersey wheeler-dealer, Vesco had spent several years building the International Controls Corporation (ICC), a diverse conglomerate involved in everything from industrial valves to cryogenics and weapons manufacture. In 1971, employing devious backdoor tactics, Vesco gained control

With the financial involvement of the Swire Group in 1968, Bahamas Airways acquired a small fleet of BAC One-Elevens for its services from Nassau and Freeport to Miami, Fort Lauderdale and West Palm Beach in Florida, including VP-BCO (c/n 189), seen here at Miami in May 1970, a mere five months before the airline ceased operations.

PETER KEATING © A FLYING HISTORY LTD







ABOVE LEFT ***Dubbed "the undisputed king of the fugitive financiers", Robert Lee Vesco was born in Detroit and began his career as a metal trader before founding the holding company ICC in 1965.*** **ABOVE RIGHT** ***"Ike" Eisenhauer was Vesco's personal pilot, and later wrote*** **The Flying Carpetbagger** ***about his experiences with Vesco.***

of the ailing Geneva-based Investors Overseas Service Ltd (IOS) mutual fund founded by Bernie Cornfeld, and proceeded to milk its assets (much as Cornfeld had done), moving them into multi-layered overseas shell companies.

Vesco arrived in the Bahamas in his executive-configured 707-121 N11RV, named *Silver Phyllis*, commanded by his personal pilot Capt A.L. "Ike" Eisenhauer. Vesco was no stranger to the benefits of corporate aviation. Back in the late 1960s, when he was building the ICC portfolio, Vesco frequently chartered aircraft from Fairfield Aviation at Caldwell Airport (Essex County Airport), New Jersey, close to the ICC headquarters. When Vesco's business activities widened, he decided to buy the operation as a basis for starting his own corporate aviation department. A deal was concluded and former US Navy pilot Eisenhauer was hired to run the show. In late 1968 a Grumman Gulfstream I was purchased for corporate use. Vesco had intended to build up a network of commuter airlines and fixed-base operators (FBOs), buying up Princeton Aviation (Princeton Airways) in New Jersey and Golden West Airlines in California in May 1968, both of which needed new finance to expand. The venture proved to be non-starter, however, and Vesco soon baled out with the loss of several million dollars.

With Vesco spending more time in Europe, the Gulfstream was proving inadequate, needing two refuelling stops per transatlantic crossing, so in June 1971 it was replaced with former Pan Am 707 N11RV. The new owner had already concocted a clever scheme to get it for nothing. The ICC entered a lease-back agreement with the aircraft's nominal owners, Skyways Leasing, a dummy subsidiary of Fairfield Aviation, giving it rights to use the 707 for an annual rental. Exorbitant operating expenses were billed to IOS, not by the ICC (as the operator) but by Skyways, which accrued vast amounts of cash to fund Vesco's other nefarious schemes. Having gained control of IOS in July 1971, Vesco embarked on an aerial looting tour of the fund's assets in his new toy.

Bahamasair is born

In early 1973 BWA applied to the CAB for a Foreign Air Carrier Permit to enable it to conduct a wide range of charters to, from and via the USA. But any aspirations BWA may have had for expansion or eventual scheduled flag-carrier status were soon dashed. After exhaustive enquiries the CAB concluded that BWA was neither fit nor able, financially nor managerially, to qualify for an American permit. The CAB had discovered that, through BWA's tangled shareholding and intercorporate structure, full Bahamanian ownership and control of the airline was not assured. Among the major stockholders was lawyer, company secretary and later cabinet minister Kendal W. Nottage, who, along with Bannister, was later indicted in the USA for laundering drugs money.

The airline's balance sheet was precarious to say the least, with a deficit of around $1·1m, assets of $230,000 and current operating losses of $265,000, while only three of its management personnel had any significant airline experience. Of those, chief pilot Capt John Roberts had flown with Northern Wings in Canada, BAL and Bahamian inter-island operator Flamingo Airlines before joining BWA, while his deputy, Al Hall, had also served with BAL and Flamingo. For a while Richard A. Forham, formerly with Pan Am, served as general manager.

Having dumped the Swire Group and with



Bahamian inter-island operator Flamingo Airlines was established in March 1971 and used a mixed fleet of aircraft, including Convair 240 N17417 (c/n 108), seen here at Miami in February 1973, shortly before the airline was merged with Out Island Airways to become Bahamasair, although this aircraft did not join the Bahamasair fleet.

PETER KEATING © A FLYING HISTORY LTD

no prospect of BWA taking over, the newly independent Bahamas was left without an identifiable national air carrier of its own. In the two years since BAL's demise, some of the slack had been taken up by Out Island Airways (OIA). Refinanced in early 1971, OIA had as its Senior Vice-President BAL's former chief mechanic, Edward F. Albury.

The plan was for OIA to become the Bahamas' replacement flag-carrier, the company offering the government a 20 per cent stake. As a white-owned business, however, it was on Pindling's "hit list" and the government wanted it all. After obtaining a 51 per cent stake in OIA in early 1973, the Bahamian government compulsorily purchased the remainder of the airline for just 30 cents on the dollar. Flamingo, which operated an inter-island network plus services to Port-au-Prince in Haiti using a variety of equipment including Convairs, Martins and Lockheed Electras, was also acquired; and its assets, minus routes, were allocated to BWA.

A new airline, Bahamasair, was formed with the merger of OIA and Flamingo, with Albury continuing as manager, operations commencing on June 17, 1973. *Flight's World Airline Directory* for 1974 lists the airline's fleet as comprising three One-Eleven 400s, three Fairchild Hiller FH-227s, two de Havilland Canada Twin Otters, three Aero Commanders, one Grumman Goose and one Widgeon. The company would go on to operate a variety of other equipment, including Boeing 727s and 737s and ATRs. A leased C-46 was also flown for a while on cargo flights.

From the outset Bahamasair was plagued by financial woes, maintenance difficulties, scandals and gross mismanagement as a result of government meddling. While maintaining an unblemished safety record, it nevertheless retains an unfortunate reputation for indifferent passenger service and poor timekeeping. Despite the Bahamian government having poured countless millions in subsidies into the airline, it has never turned a profit.

Meanwhile, back at BWA . . .

It seems fairly certain that Vesco's money helped keep BWA afloat, although this had as much to do with distributing handouts as it did the airline's wellbeing. One of Vesco's first acts in the Bahamas was to form the Bahamas Commonwealth Bank (BCB), officially to aid local citizens with low-cost loans for mortgages. In reality it was just another vehicle for hiding his looted money, including that "earned" from IOS by Skyways Leasing.

BELOW ***In its new Bahamasair scheme, but still bearing the initials of Out Island Airways on the fin, One-Eleven Series 401 VP-BDN (c/n 062) is seen here at Miami in 1973. Two One-Elevens were inherited from OIA, one of which was disposed of that December, and two more had been acquired from American Airlines by the end of the year.***

PETER KEATING © A FLYING HISTORY LTD





JACQUES GUILLEM COLLECTION VIA TOM SINGFIELD

ABOVE ***Seen here at Le Bourget in its BWA colours in June 1973, 707-321 VP-BDF (c/n 18085, formerly G-AYAG with Lloyd International) was originally delivered to Pan Am in 1961 as N759PA. A typical BWA freelance flightcrew comprised a captain, first officer, flight engineer and navigator, all of which were paid over the odds for their services — and discretion.***

Substantial unsecured loans granted by the bank to BWA did not benefit the airline, but were moved onwards by Bannister to Pindling and his associates. According to an in-depth investigation by the *Miami Herald* in the second half of 1984, Vesco's bank loaned BWA $3·6m to purchase two jetliners and granted another $7m in unsecured loans, while also providing $3·6m for the purchase of Bahamas Catering Ltd, which provided food services at Nassau Airport.

Despite these handicaps BWA trundled on, paying its four or five freelance aircrews handsome remuneration, around a third more than they could have earned in the UK. The crews, however, always suspected the airline was being used for murkier purposes. According to one former employee, anonymous packages would often appear for last-minute loading minutes before departure from the Bahamas. These were always stated to be brochures and tickets, but were suspected of containing cash or other moveable financial commodities. It paid — literally — not to ask too many questions.

There was a precedent. In late June 1971, while awaiting departure from Geneva in *Silver Phyllis*, Eisenhauer was unexpectedly confronted by a truck containing 1,100lb (500kg) of unmarked boxes. These later proved to contain 135,000 IOS share certificates "lifted" from the Overseas Development Bank, which would enable Vesco to seize control of IOS at a crunch stockholders' meeting in Toronto a few days later. Four months later Vesco and his two accomplices were temporarily jailed in Switzerland, accused of fraud and embezzlement, but they jumped bail and hightailed it back to the USA.

The first 707 acquired by BWA was returned and sold on to National Aircraft Leasing in August 1974, but two 707-321s — VP-BDF and 'BDG — had been acquired from Lloyd International in December 1972. Apart from the regular transatlantic movements, these aircraft were leased briefly during 1973 to Balkan Bulgarian Airlines and Air Algérie, the latter for *Hajj* charters to Mecca. Some 25 runs to Luanda in Angola were made during 1974 on behalf of *Transportes Aéreos Portugueses* (TAP), in order to repatriate Portuguese nationals to Lisbon during the conflict following Angola's independence.

In August 1974 BWA was declared bankrupt, with "paper" debts of $10·5m. Its two Boeings had been already repossessed by Vesco's BCB that May and by August the following year both had been delivered to Dublin for storage by Aer Lingus. There they remained until 1978 when the BCB was itself placed in administration, and the receivers put both aircraft up for sale.

A second chance

This was not to be the end of the story, however. A few months after BWA's closure, a revived version appeared in the form of Bahamas World Airways (1974) Ltd, although it would fare no better than its predecessor. Although Bannister seemingly remained in overall charge, Pindling's business attorney Jack Duffus was hired to form this second incarnation of BWA and its catering associate, ensuring that his client — Pindling — received undisclosed shares in both companies.

The new BWA eventually took wing in June 1976, flying leased Convair 880 N55NW on shuttle services between Miami and Nassau to connect with International Air Bahama's budget-fare flights to Europe. As this aircraft did not have the non-stop range to reach Europe, a second Convair 880, N880JT (c/n 22-7-8-60), was leased that July to resume charters to



JACQUES GUILLEM COLLECTION VIA TOM SINGFIELD

ABOVE ***Acquired by BWA at the same time as VP-BDF in December 1972, VP-BDG (c/n 18084, formerly G-AYRZ) had followed an identical career path to 'BDF, having also initially served with Pan Am, as N758PA. After being in storage at Dublin during 1975–78, the 707 was re-registered N433MA and leased briefly to Southeast Airlines.***



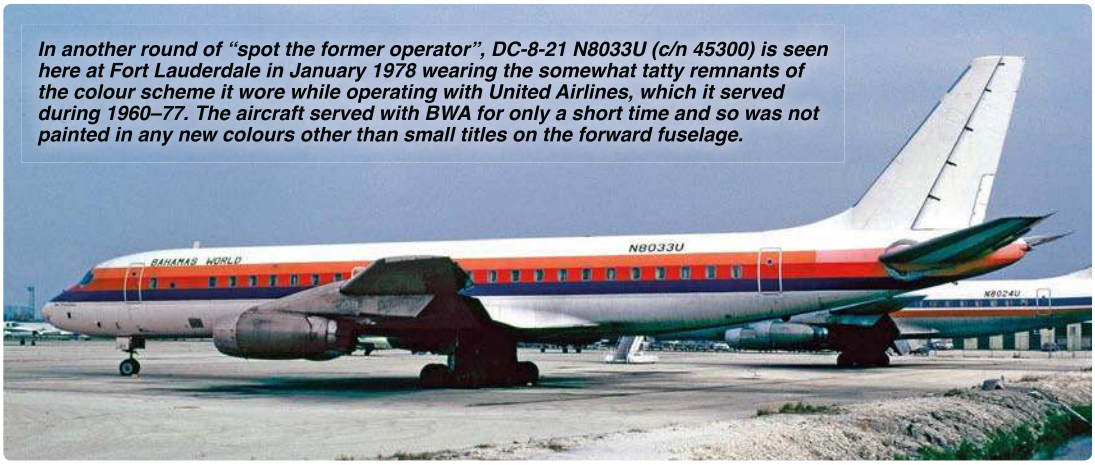
TOM SINGFIELD COLLECTION

ABOVE ***Still showing the vestiges of the colour scheme it wore while with Delta Airlines (for which it set a trans-USA speed record on its delivery flight from San Diego to Miami as N8802E in February 1960), Convair 880 N55NW (c/n 22-00-07) is seen here with its "Bahamas World" titles and a much smaller dolphin logo on the fin circa 1976.***



JACQUES GUILLEM COLLECTION VIA TOM SINGFIELD

ABOVE ***Originally delivered to Trans-Canada Air Lines as CF-TJJ in March 1961, DC-8-43 N8021V (c/n 45612) went on to serve with Air Canada, Cubana, Aeroperú and Air Jamaica before being leased to BWA in late 1979. Although it was given "Bahamas World" titles, as seen here in 1980, the airline never actually took delivery of the aircraft.***



In another round of "spot the former operator", DC-8-21 N8033U (c/n 45300) is seen here at Fort Lauderdale in January 1978 wearing the somewhat tatty remnants of the colour scheme it wore while operating with United Airlines, which it served during 1960–77. The aircraft served with BWA for only a short time and so was not painted in any new colours other than small titles on the forward fuselage.

JACQUES GUILLEM COLLECTION VIA TOM SINGFIELD

Brussels and Frankfurt. After just a few months, however, BWA was in trouble again when in late December N880JT was impounded at London-Gatwick for three months for non-payment of landing charges.

This was the beginning of a trend that would see the number of places where BWA aircraft could land without being detained diminish rapidly. In November 1977 an attempt was made to lease 707-321 G-BAEL (c/n 17602) from British Midland Airways to ease the situation over the impounded Convair. A former BWA aircrew member, by this time working for British Midland, blew the whistle on his former employer, and, although the aircraft had already been painted in BWA colours at East Midlands Airport, the deal was immediately scotched.

Increasingly desperate, BWA then turned to Transasian Airways (formerly wet-leasing specialists Templewood Aviation) for the lease of a 707-139B, 9G-ACJ (c/n 17903), in December 1977, but this fell through three months later, when BWA again failed to honour its payments.

This pattern continued, with BWA grubbing around for any aircraft available from sources unaware of its unreliable reputation. Next on the books was 707-321 N70798 (c/n 17605), leased from cargo operator Bayu Indonesia Air during March–April 1978, followed by McDonnell Douglas DC-8-21 N8033U. The latter was returned in late 1978, leaving the airline without any operational capacity in the run-up to the traditionally busy Christmas period.

Nevertheless, BWA was back on the Atlantic run from February 1979 with a new DC-8-43, N8418, now flying into Luxembourg in direct competiton with International Air Bahama. Late in 1979 BWA attempted to lease another DC-8, Model 40 N8021V, from International Air Leases; although it was given "Bahamas World" titles, the transaction fell through before delivery.

The airline's final aircraft was 707-321B N495PA (c/n 19697), obtained through Jet Executive International in October 1981. This flew only irregular services, mainly to Cologne.

Bahamas World had been in a downward spiral for some time; and, with the repossession of N495PA in February 1982, the company folded for the final time, leaving a trail of unpaid bills — and the Bahamas without any homegrown long-haul capability. In 2019 Bahamasair still only operates regional services to Florida, Cuba and the Turks & Caicos Islands.

Postscript

Although retaining the right to Bahamian residency, by 1973 Vesco had largely decamped to Costa Rica, where he enjoyed protected status under President José Figueres Ferrer. For the next five years Vesco was free to continue with his nefarious schemes, spreading his largesse among the country's movers and shakers. By nature Vesco was paranoid, not least about *Silver Phyllis* (pun intentional — aka "The Flying Brothel"), by this time outfitted at great expense with a plush office, bar, sauna and discotheque.

Having parted company with Eisenhauer in July 1973, and anxious to keep his luxurious executive toy out of the hands of unfriendly authorities and the ICC, the directors of which were making concerted efforts to oust him, Vesco arranged for a BWA crew to keep it moving around South America. The 707 eventually ended up at Tocumen in Panama, from where Vesco planned to sell the aircraft through Air Inter-Sales, another of his numerous dummy companies, and keep the proceeds. However, others with a claim on the aircraft — including Eisenhauer for $55,000 in unpaid salary, and Pan Am for the final $600,000 mortgage payment — managed to obtain a lien on the Boeing.

Aided by friendly New Jersey Superior Court Judge Irwin Kimmelman, a scheme was hatched to reclaim the aircraft and have it returned to the USA. Eisenhauer and a crew acting as "repo men", having assuaged the local authorities and paid the fines imposed for an unauthorised landing, flew *Silver Phyllis* back to



JACQUES GUILLEM COLLECTION VIA TOM SINGFIELD

Originally delivered to Alitalia in July 1960 as I-DIWI, DC-8-43 N8418 (c/n 45600) is seen here in March 1979, the month after it had joined the BWA fleet for transatlantic runs between the Bahamas and Luxembourg. It remained with BWA until the spring of 1981, when it went to South America to serve various carriers until it was scrapped in 1985.

Newark, New Jersey, where it was disabled and impounded by local sheriffs. One surprise had been its "disguise" re-registration as N99WT by Skyways, whose top man was working with Vesco to save his aircraft.

A change of regime in Costa Rica in 1978 meant that Vesco was no longer safe there, and he found temporary sanctuary in Nicaragua under the Sandinistas, before being granted "humanitarian residency" in Castro's Cuba in 1982. He apparently still hadn't learned his lesson and was jailed for 13 years in the early 1990s for a fraudulent scam involving "trixolan" (TX), a so-called AIDS and cancer wonder-drug.

Having successfully evaded the USA's law enforcement agencies for years, it was ironic that he should be put behind bars by Castro's anti-USA regime. An inveterate smoker, he reportedly died of lung cancer in Cuba in 2008. Vesco had also been indicted in the USA for conspiring with Colombian Medellín Cartel member Carlos Lehder to help route drug shipments through Cuba. Lehder had earlier been allowed to take over Norman's Cay in the Bahamas as his own private HQ and air-shipment point for drug consignments into Florida.

As for *Silver Phyllis*, it eventually found its way into the hands of another international villain, President Marcos of the Philippines, as his private jet. Apparently little-flown, the 707 ended up as the "Club 707" restaurant at a site adjacent to Manila's international airport, before being scrapped in 1982. The restaurant traded on the myth that the aircraft had once been owned by Elvis Presley; the singer's representatives had indeed made a £75,000 down-payment in 1975, but they subsequently cried-off after learning that there was no unimpeded title to the aircraft.

Criminal activity had flourished in the Bahamas for centuries, and in more recent times aviation has found a place in this buccaneering history. The characters in this tale were the modern pirates of the Caribbean, rivalling the legends of Blackbeard and Henry Morgan. Bahamas World Airlines wove itself into this tapestry of disrepute, largely owing to the prevailing climate of greed and political corruption. Sadly, BWA failed to achieve its potential as an international airline able to spread the Bahamas flag far and wide.

ACKNOWLEDGMENTS *The author and Editor would like to thank "Capt X", Jon Proctor, Michael Zoeller, Tom Singfield and Jonathan Walton for their invaluable help*



JONATHAN WALTON COLLECTION

ABOVE ***Boeing 707-321 N11RV (c/n 17606) was delivered to Pan Am as N728PA in March 1960, and acquired by Robert Vesco's ICC organisation in June 1971, when it was re-registered N11RV (for Robert Vesco).*** **Silver Phyllis, *as the 707 was named by Vesco, is seen here during a visit to Heathrow in 1972, bearing the ICC logo on the fin.***



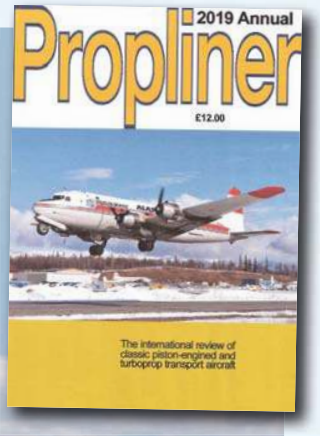
More pages than ever — price held!

The 2019 Propliner Annual

This year's eagerly-awaited issue includes in-depth features on:

- Erickson Aero Tanker's DC-7s
- Aer Lingus' Viscount 700-series ops
- Flying Buffalo Airways' Electras
- India's early airlines
- The An-12 and Ruby Star Airways
- Coventry Airport remembered
- Daks Over Dallas Air Show

+ much much more . . .

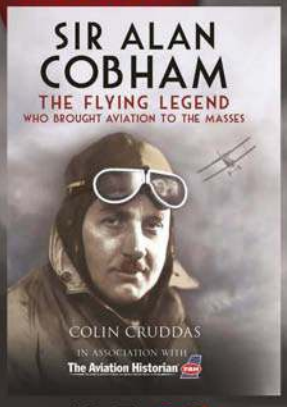


£12 (UK) £15 (Europe) £18 (RoW) **www.propliner.co.uk**

144 pages!



EXCLUSIVE 30% DISCOUNT



~~£25.00~~
£17.50

SIR ALAN
COBHAM
THE FLYING LEGEND
WHO BROUGHT AVIATION TO THE MASSES
COLIN CRUDDAS

This is the long-awaited biography of one of the most important characters in British aviation history. Published by Pen & Sword in association with The Aviation Historian, this hardback book is written by former Flight Refuelling Ltd archivist and Cobham specialist Colin Cruddas and relates the young Alan Cobham's experiences with the Royal Flying Corps during the First World War and his subsequent pioneering aerial activities around the world, the effects of which still resound today. From his formative years in South London in the early 20th Century to his death in 1973, this definitive biography tells the full story of one of Great Britain's most illustrious and innovative airmen and captains of industry.

TO ORDER CALL AND QUOTE CODE **SAC001** TO RECEIVE YOUR 30% DISCOUNT:

01226 734222

OR ORDER ONLINE

www.pen-and-sword.co.uk

THE OLDEST SWINGER IN TOWN

Leslie Baynes's variable-geometry supersonic jet fighter designs, 1947–50

With the retirement this year of the RAF's "swing-wing" Panavia Tornado, the once-radical variable-geometry concept leaves UK service. Some rare 1940s drawings by British designer Leslie Baynes, recently acquired by the Farnborough Air Sciences Trust (FAST), show that the idea is older than you might think, as **TONY BUTTLER AMRAeS** relates

DURING THE LATE 1940s and into the 1950s, aircraft designers — in their quest for ever-higher speeds and greater performance — made use of advanced aerodynamics and the new jet engine. As aircraft approached the speed of sound, different ideas as to how controlled flight beyond the sound barrier might be achieved began circulating. A corollary to this was the need to ensure that an aircraft capable of supersonic flight would also still be controllable at its take-off and landing speeds, which need to be kept as low as possible for the sake of stability and safety. Certain supersonic wing shapes (such as the delta or highly swept wing) were not suited for low-speed flight. It was these conflicting issues that led to some novel — and ultimately prescient — proposals for high-speed aeroplanes during this period. One such case was an offering made during the late 1940s by Leslie E. Baynes, at that time chief designer of the Aircraft Section of Alan Muntz & Co Ltd, based at Heston, West London.

Baynes had already established a track record for producing unusual experimental aircraft, including the Carden-Baynes Bee two-seat light touring aircraft first flown in April 1937; the Baynes Bat experimental tailless glider first flown in July 1943, and the Youngman-Baynes High-Lift Experimental Aircraft (aka Percival P.46) flown in February 1948. During the mid-1920s Baynes had been responsible for the aerodynamic design of the Short Singapore flying-boat, and, later that decade, designed and built the first all-British glider to soar, the Abbott-Baynes Scud 1.

Presaging developments that would not see widespread use for decades, Baynes's supersonic proposal for Muntz made use of variable-geometry "swing-wings", plus a variable-geometry tailplane and fin. A variable-sweep wing allows the angle of sweep (and thus the wing shape) to be altered during flight, so that after take-off it can be swept fully back for high-speed flight and then returned to its original "forward", high-lift position for landing.

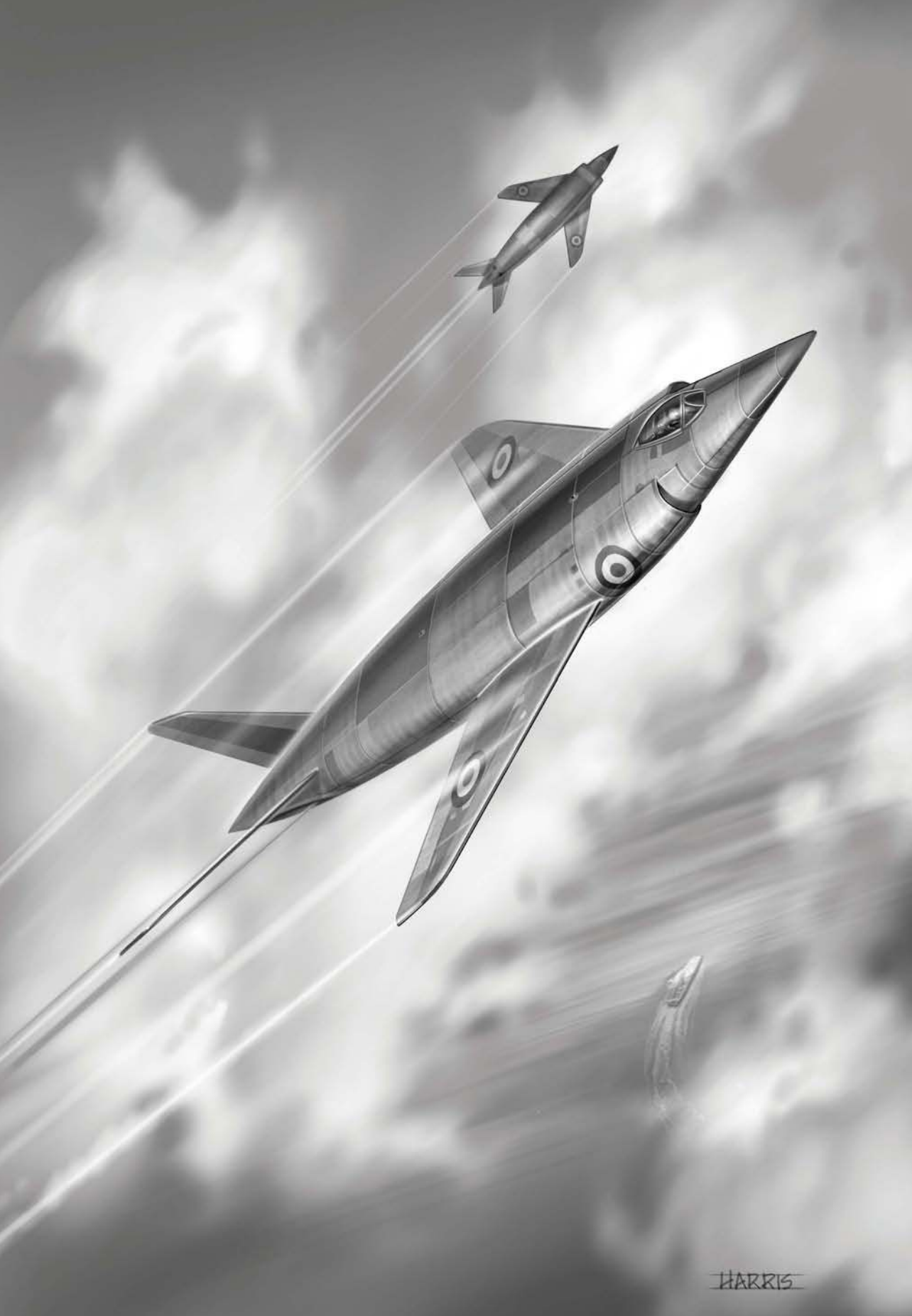
The science bit

Baynes worked on supersonic aircraft studies for some years, and before taking a look at his specific proposals it is worth quoting him on how these ideas came about. The following comes from a technical paper published in the September 1955 issue of the journal *Aeronautics*:

"In the evolution of the modern aeroplane, the fixed wing with hinged control surfaces has survived, having proved efficient and satisfactory for speed of flight up to that of sound; but with the advent of greatly improved propulsive systems [i.e. jet engines] providing sufficient power for flight at and beyond the speed of sound, an entirely new set of problems has arisen which requires radical departures in both the shape and the method of control of aeroplanes.

"It is well known that as an aircraft approaches the speed of sound a rapid rise of drag, a loss of

OPPOSITE PAGE ***An impression of Leslie Baynes's design for a Tay-engined variable-geometry supersonic naval fighter by storyboard artist MARK HARRIS (© 2019), based on a newly discovered drawing recently acquired by FAST, with 3D modelling by NEIL FRASER. For more info on Mark's storyboard work, visit www.markharris.ca.***


HARRIS



PHILIP JARRETT COLLECTION

LEFT ***It seems that Leslie Everett Baynes AFRAeS was somewhat camera-shy, there being few photographs of this highly inventive and creative designer readily available. This detail from a larger photograph shows Baynes beside the sole Carden-Baynes Bee in 1937. Born in Barnes, West London, in March 1902, Baynes joined Airco at Hendon at the age of 16 before moving on to Short Bros at Rochester in the 1920s.***

lift and a marked change in pitching-moment occur owing to the effect of the compressibility of the air, and that the critical speed at which these compressibility effects occur is increased and the adverse effects are minimised if the wings and tail surfaces have a pronounced sweepback, and if the aspect-ratio and thickness/chord ratio are substantially reduced. While these planforms and thin-wing sections may be a near approach to the ideal for the achievement of transonic or supersonic flight, they are manifestly unsuitable for slow-speed flight for several reasons."

The reasons quoted in the paper included the low maximum lift obtainable with swept-back wings and thin wing sections, and the tendency towards wingtip stalling and instability with high degrees of sweepback. Baynes's paper added:

"Since the planform and other characteristics required for supersonic flight are, therefore, in direct conflict with those required for slow-speed flight, and since the ratio between maximum and minimum speed, or the speed range, should now be of the order of 10:1 or more, there is clearly a need for some means to change the planform and other characteristics to suit these extreme conditions of flight. It is also well known that, as a further adverse compressibility effect, conventional hinged control surfaces tend to become ineffective at transonic and supersonic speeds, and that aeroelastic deformations of the wings in torsion and bending are likely to cause reversal of control at these speeds unless wings can be designed with very much greater stiffness than has been found possible hitherto.

"It appears, therefore, that an aircraft designed to function at both low subsonic and at supersonic speeds requires, in addition to variable planform, a new system of longitudinal and lateral control which will not be adversely affected by the above-mentioned compressibility phenomena or aeroelastic deformations."

The outcome was the set of design proposals outlined here. The main proposal brochure and the first two drawings may be found in the UK National Archives in file AVIA 54/481, but previously unpublished drawings have also recently been donated to the Farnborough Air Sciences Trust, including a third drawing showing a fighter design for naval carrier operation, published here for the first time.

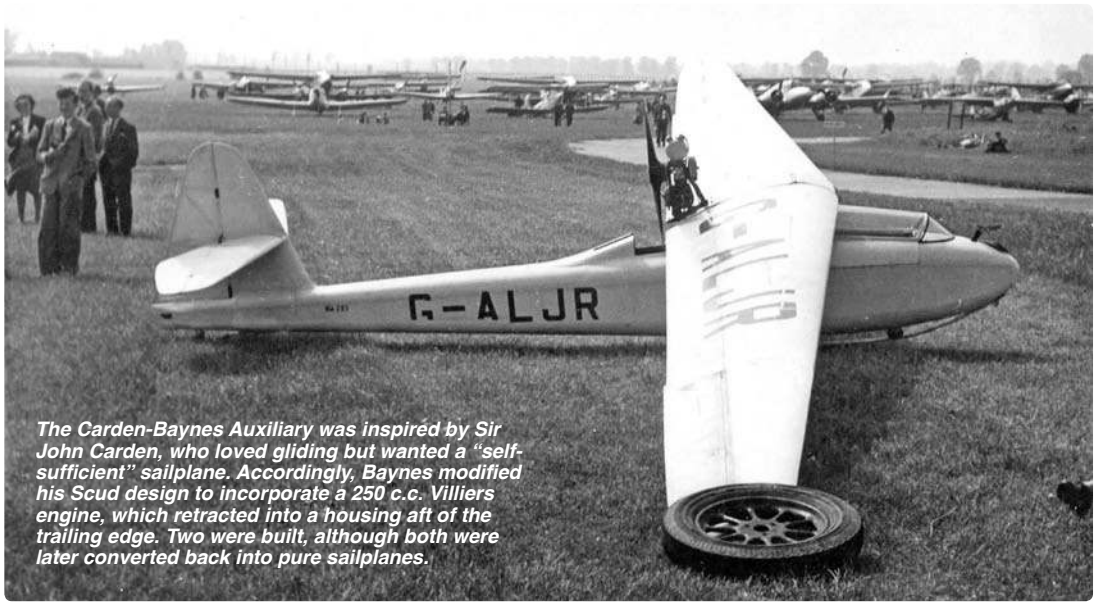
The hardware

Design work on Baynes's supersonic proposals started early in 1947 and became the subject of a number of British and foreign patents. The first was applied for in March 1949 under the title "Improvements in High Speed Aircraft" and was made in conjunction with Alan Muntz Ltd.



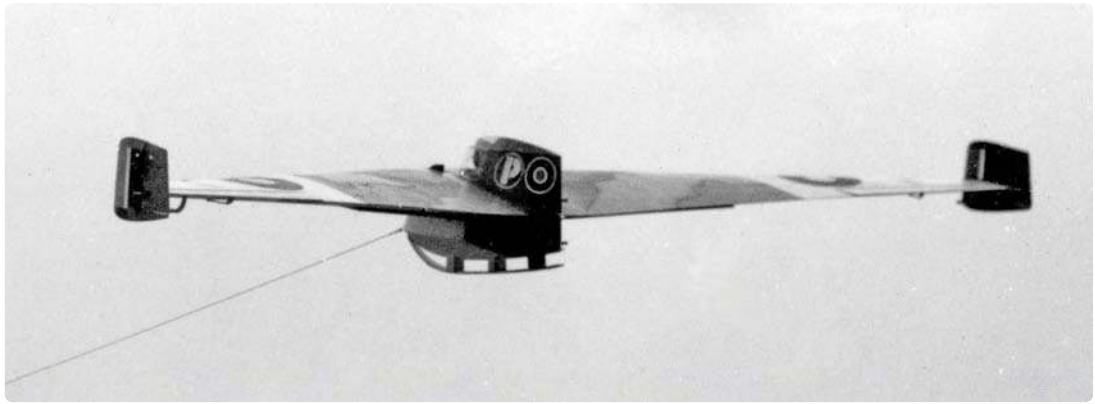
In 1934 Baynes formed Carden-Baynes Aircraft Ltd with Sir John Carden, although the latter was sadly killed in an air accident on December 10, 1935. The company continued, however, and in April 1937 the two-seat twin-pusher-engined Bee made its first flight.

TAH ARCHIVE



The Carden-Baynes Auxiliary was inspired by Sir John Carden, who loved gliding but wanted a "self-sufficient" sailplane. Accordingly, Baynes modified his Scud design to incorporate a 250 c.c. Villiers engine, which retracted into a housing aft of the trailing edge. Two were built, although both were later converted back into pure sailplanes.

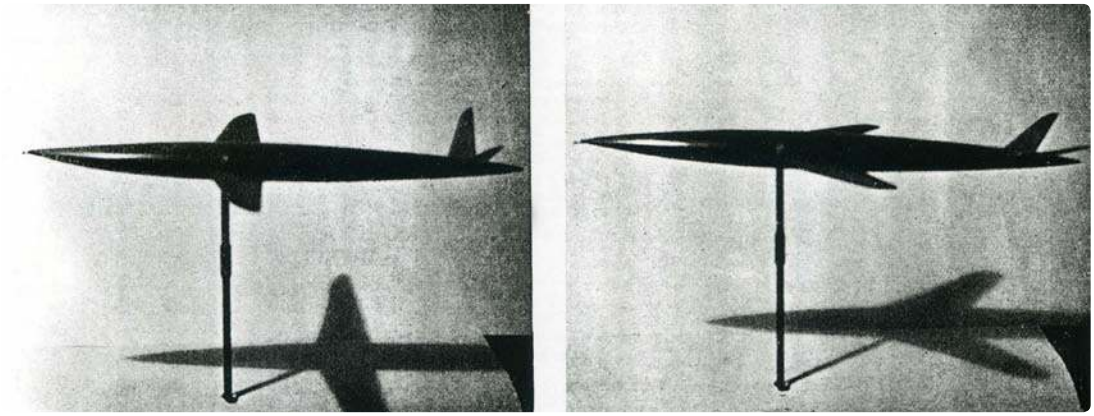
PHILIP JARRETT COLLECTION x 3



ABOVE *In 1941 Baynes proposed that most armoured vehicles, even up to an 8½-ton (8,630kg) tank, could be transported by air with the addition of a quickly detachable "all-wing" section. A ⅓rd-scale manned flying model of the "Carrier Wing" (aka Bat) was built by Slingsby and tested in the summer of 1943. The idea was not adopted.*

Using a Percival Proctor IV as a basis, Baynes co-operated with fellow designer Robert T. Youngman to create the Youngman-Baynes High-Lift Experimental Aircraft while working for Alan Muntz at Heston. The aircraft, serial VT789, also known as the Percival P.46, incorporated an extensive full-span slotted-flap system for research into short-landing performance, and made its first flight in February 1948.





AUTHOR'S COLLECTION

ABOVE ***A rare pair of photographs first published in the September 1955 issue of*** **Aeronautics,** ***showing a windtunnel model of a Baynes variable-geometry supersonic design with its wings and V-tail in the fully forward position (left) and fully swept. Baynes was granted patents for his "swing-wing" concept in both the UK and USA.***

In February 1949 Baynes completed a project brochure which described a supersonic twin-jet research aircraft, which was submitted to the Ministry of Supply (MoS). The design incorporated variable sweep, employed as a system of control in place of conventional hinged control surfaces, along with variable wing incidence, variable dihedral and differential wing-sweep.

The wing-sweep angle in the fully forward position was 20°, increased to 60° when fully swept. When fully forward the tail was swept 15° and could also be swept to a maximum of 60°. The fuselage had an elliptical cross-section to accommodate two 7,500lb (3,400kg)-thrust axial-flow turbojets mounted side-by-side aft of the wing roots, probably Armstrong Siddeley Sapphires, to be supplied with air by two inlet ducts in the nose, which diverged to clear the pilot's cockpit. The jetpipes converged slightly towards the tail and terminated at the rear of the aircraft in a "pen-nib" arrangement. A tricycle undercarriage with hinged mainwheels was incorporated, the latter retracting into the underside of the fuselage.

Differential sweep

This design employed variable sweep for both lateral and longitudinal control, thus replacing conventional ailerons. The former was effected by a differential change in wing-sweep, such as to cause an increase in span of one wing with a decrease in span on the opposite wing. This would produce a spanwise displacement of the aerodynamic centre relative to the aircraft's centre of gravity and a change in the relative incidence of each wing.

Directional control was to be obtained by having the tail surfaces hinged in a similar way to the wings to provide variation of incidence with variation of sweepback. When these were moved in unison they controlled the aircraft in pitch, and when moved differentially relative to each other they would provide effective control in yaw from low speeds right through to supersonic speeds (the brochure stated that this was not the case with a normally hinged rudder). The differential hinge movement for both wing and tail was ±5°.

Baynes realised that there would be a number of major engineering problems associated with the design of the hinged joints, which would also engender a weight penalty, but he stressed that the substantial gain in maximum lift would reduce the wing area required, and hence the wing weight, to an extent that would more than offset the increase of the structure weight owing to hinging.

The Baynes/Muntz supersonic variable-sweep design had a span of 38ft 9in (11·81m) when the wings were in their forward position and 24ft 2in (7·38m) when fully swept; in both positions the quoted gross wing area was 220ft² (20·46m²) while the respective thickness/chord ratios were 8·6 per cent and six per cent. The fighter was 67ft 6in (20·57m) in length and had a projected gross weight of 20,000lb (9,072kg), which included 6,000lb (2,722kg) of fuel. It was expected to have a maximum speed of Mach 1·5 (with wings fully swept) and a stalling speed, at a weight of 15,000lb (6,804kg), of 115 m.p.h. (185km/h).

The brochure also included a proposal for a half-scale aerodynamically similar aircraft, to be powered by a 1,100lb (500kg)-thrust Armstrong Siddeley Adder jet. This would serve as "an economical method of testing the system of control outlined [herewith]". The span fully forward and fully swept was 19ft 4½in (5·9m) and 17ft 1in (5·21m) respectively; thickness/chord ratios were 9·6 per cent and 6 per cent respectively, and in both configurations the gross wing area was 55ft² (5·12m²). The length was 33ft 7in (10·24m) and a fuel load of 43gal (196lit) gave a gross weight of 2,500lb (1,134kg). The scale aircraft was expected to have a maximum speed of 608 m.p.h. (978km/h or M0·8) at sea level and 568 m.p.h. (914km/h or M0·86) at 36,000ft (10,970m). Its stalling speed was to be around 88 m.p.h. (142km/h).

FARNBOROUGH AIR SCIENCES TRUST © 2019

SECRET

GENERAL ARRANGEMENT OF PROPOSED

— BAYNES SUPERSONIC AIRCRAFT —

2-7500 LB. S.T. AXIAL FLOW JET UNITS

ALAN MUNTZ & Co LTD
HESTON AIRPORT MIDDX.
DRG. Nº AX69

	SPREAD	SWEPT
SPAN	38' 9"	24' 2"
LENGTH	67' 6"	67' 6"
WING AREA (NET)	165 SQ.FT.	132 SQ.FT.
" " (GROSS)	220 SQ.FT.	220 SQ.FT.
WING SECTION T/C RATIO	8·6%	6%
MEAN CHORD	5·68 FT.	9·13 FT.
DIHEDRAL	6°	0°
ASPECT RATIO	6·85	2·65
TAIL AREA (NET)	37·5 SQ.FT.	32 SQ.FT.
" " (GROSS)	52 SQ.FT.	52 SQ.FT.
TAIL VOLUME RATIO	1·36	·7
FIN AND RUDDER AREA (NET)	24 SQ.FT.	20 SQ.FT.
" " " (GROSS)	34 SQ.FT.	34 SQ.FT.
FIN AND RUDDER VOL. RATIO	·115	·18
WING LOADING (@ 20,000 LB.)	91 LB/SQ.FT.	91 LB/SQ.FT.
" " (@ 15,000 LB.)	68 LB/SQ.FT.	68 LB/SQ.FT.
WEIGHT EMPTY	12,300 LB.	12,300 LB.
FUEL (6,000 LB.) + LOAD (1,700 LB.)	7,700 LB.	7,700 LB.
GROSS WEIGHT	20,000 LB.	20,000 LB.
MAX. MACH Nº		1·5
STALLING SPEED (@ 15,000 LB.)	115 M.P.H.	

5 0 5 10 15 20 FEET

LONGITUDINAL CONTROL

SPAN 24' 2"

—HIGH SPEED—

LATERAL CONTROL

LONGITUDINAL CONTROL

—LOW SPEED—

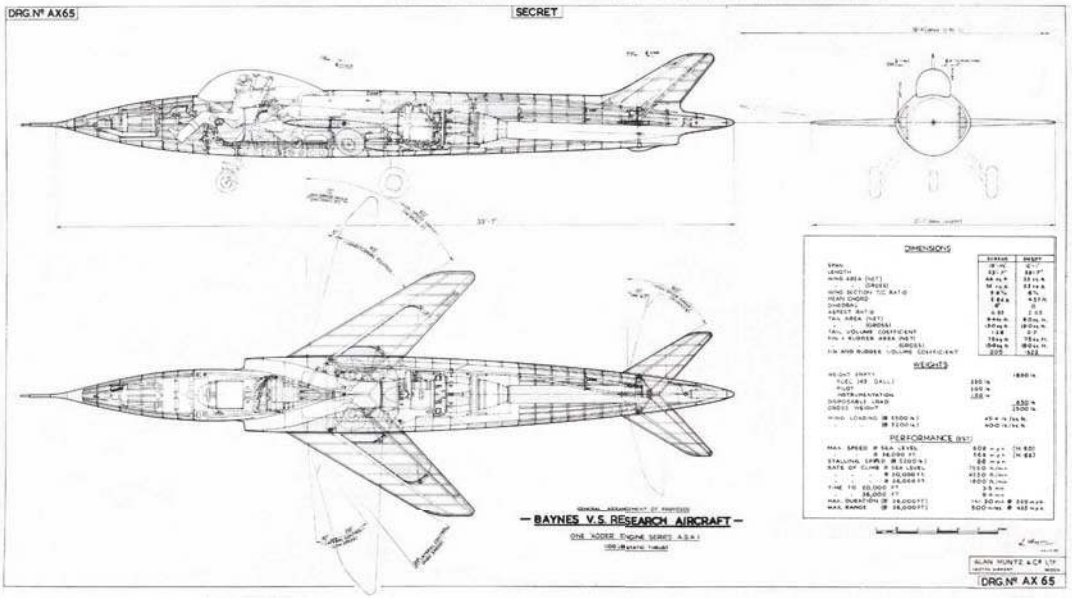
SPAN 38' 9" (SPREAD)

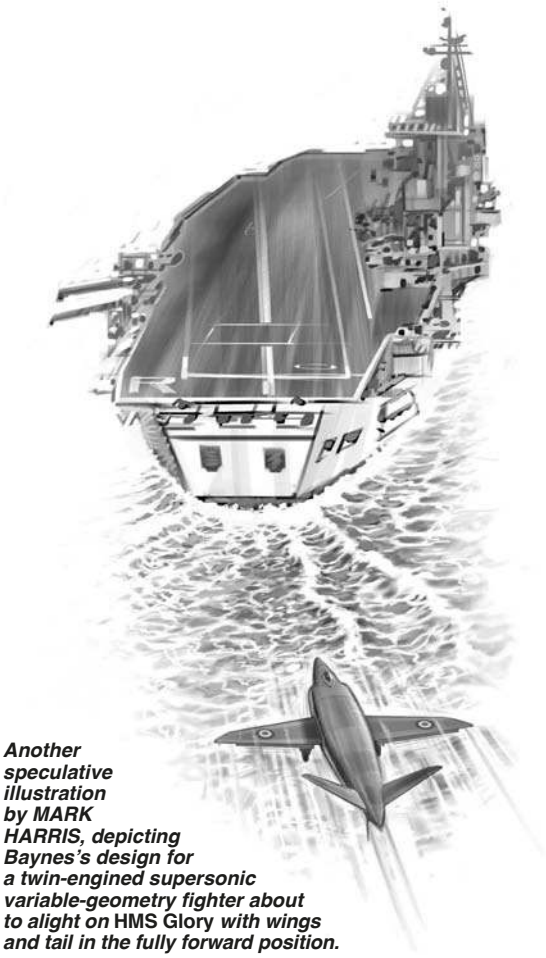
LATERAL CONTROL

LENGTH 67' 6"

Alan Muntz & Co Ltd Drawing No AX69, showing Baynes's design for a twin-engined swing-wing fighter.

BELOW ***Drawing No AX65 for a half-scale single-engined proof-of-concept aircraft.***





Another speculative illustration by MARK HARRIS, depicting Baynes's design for a twin-engined supersonic variable-geometry fighter about to alight on* HMS Glory *with wings and tail in the fully forward position.

MARK HARRIS © 2019

These proposals were discussed at the MoS at Thames House South on January 17, 1950, in a meeting which included Ministry officials J.E. Serby and H.F. Vessey, plus Baynes himself, Alan Muntz and others. The design was heavily criticised, with representatives from the Royal Aircraft Establishment (RAE) at Farnborough in particular disapproving of the method of longitudinal control. Earlier, on January 1, Mr S.B. Gates of the RAE had written to Vessey, stating that "by accepting a tail, Baynes starts with a big advantage over Wallis; but by sweeping the tail Baynes commits it to a position which is probably bad when the critical Mach [number] is exceeded." (Barnes Wallis at Vickers was also exploring the world of variable geometry, but without a tailplane.) Ultimately, no action was taken as it was considered that Alan Muntz Ltd "could not be entrusted with the design and construction of such an advanced aeroplane".

Newly discovered naval fighter

The third drawing recently rediscovered by FAST shows a developed version of the supersonic research machine for use by the Royal Navy. Dated November 1950, this depicts a fighter aircraft with four guns mounted in the lower nose. The configuration was essentially the same as Baynes's supersonic fighter design, but with an arrester hook fitted beneath the aft fuselage and the engines fed by side-mounted intakes. Along with a new V-tail this gave an appearance a little like the early Supermarine studies which eventually led to the Scimitar naval jet fighter. The most marked difference is a switch to two Rolls-Royce RB.44 Tay centrifugal-flow jet engines providing about 7,700lb (3,490kg) of thrust each, exhausting through separate jetpipes. The use of these larger-diameter units results in a fatter fuselage and the drawing does not appear to show an undercarriage.

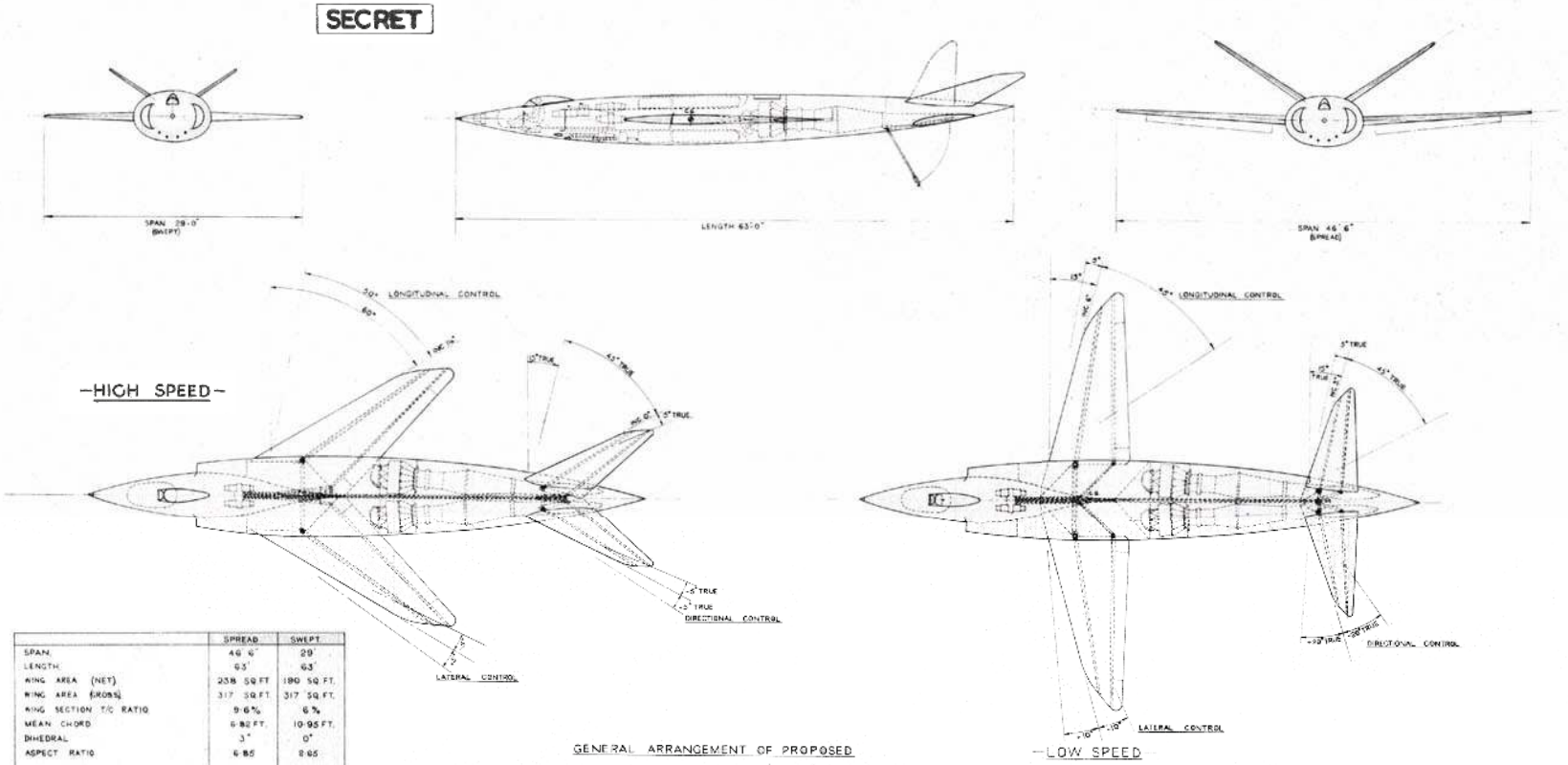
The span of this proposed naval design was 46ft 6in (14·17m) with the wings forward and 28ft 0in (8·53m) when fully swept; the thickness/chord ratios were 9·6 per cent and 6 per cent respectively, and the gross wing area for both configurations was 317ft² (29·48m²). Its length was 63ft 0in (19·20m) and the gross weight was given as 25,000lb (11,340kg), which included 7,400lb (3,357kg) of fuel and 3,000lb (1,361kg) of load (which presumably included the armament). Maximum speed in the fully swept condition was again Mach 1·5, and the stalling speed, at a weight of 20,000lb (9,072kg), was 95kt.

The story does not quite end there, however. With a renewal of interest in variable-geometry aerodynamics within the UK aircraft industry, largely as a result of Barnes Wallis's experiments, Baynes contacted the MoS on November 19, 1958, to enquire if it was prepared to consider supporting the development of a Baynes variable-geometry project in any way. Handel Davies of the RAE replied six days later, saying that there was "no likelihood" of this happening — perhaps ironic given the part Davies played in the development of the later Panavia Tornado.

With the technology available at the time, Baynes's remarkable project would have been extremely difficult to develop and produce successfully. The potential complication of the different wing- and tail-movement mechanisms seems mind-boggling, although today the use of "fly-by-wire" circuits and avionics would make the design task somewhat easier. Indeed, modern electronics have made variable geometry no longer necessary in fast jet aircraft anyway. The all-moving tailplane or "flying tail" also did away with any need for this part of an aircraft's design to incorporate such a concept.

ACKNOWLEDGMENTS *The author and Editor would like to thank Graham Rood and Brian Luff at the Farnborough Air Sciences Trust (www.airsciences.org.uk), Ian Bott, Neil Fraser and Mark Harris for their invaluable help with the preparation of this article*

SECRET



	SPREAD	SWEPT
SPAN	46' 6"	29'
LENGTH	63'	63'
WING AREA (NET)	238 SQ.FT.	180 SQ.FT.
WING AREA (GROSS)	317 SQ.FT.	317 SQ.FT.
WING SECTION T/C RATIO	9·6%	6%
MEAN CHORD	6·82 FT.	10·95 FT.
DIHEDRAL	3°	0°
ASPECT RATIO	6·85	2·65
EQUIVALENT TAIL AREA (NET)	72 SQ.FT.	61·5 SQ.FT.
EQUIVALENT TAIL AREA (GROSS)	100 SQ.FT.	100 SQ.FT.
EQUIVALENT TAIL VOLUME RATIO	1·26	·7
EQUIV. FIN AND RUDDER AREA (NET)	46 SQ.FT.	384 SQ.FT.
EQUIV. FIN AND RUDDER AREA (GROSS)	65·2 SQ.FT.	652 SQ.FT.
EQUIV. FIN AND RUDDER VOL. RATIO	·115	·18
WING LOADING (@ 25,000 LB.)	79 LB/SQ.FT.	79 LB/SQ.FT.
WING LOADING (@ 20,000 LB.)	63 LB/SQ.FT.	63 LB/SQ.FT.
WEIGHT EMPTY	14,600 LB.	14,600 LB.
FUEL (7,400 LB.) + LOAD (3,000 LB.)	10,400 LB.	10,400 LB.
GROSS WEIGHT	25,000 LB.	25,000 LB.
MAX. MACH NT.		1·5
STALLING SPEED (@ 20,000 LB.)	98 KTS.	

GENERAL ARRANGEMENT OF PROPOSED

— BAYNES V. S. NAVAL FIGHTER. —

2 · ROLLS-ROYCE TAY TURBO-JET ENGINES

0 5 10 15 20 FEET

FARNBOROUGH AIR SCIENCES TRUST © 2019

A recent donation of material to the Farnborough Air Sciences Trust, largely relating to Alan Muntz & Co Ltd, yielded this previously unpublished general arrangement drawing, AX81, of Baynes's concept for a twin-Tay-engined variable-geometry supersonic naval fighter, the head-on view of which looks very much like a V-tailed Supermarine Scimitar. After a long and remarkable, yet little-lauded, career in aeronautics, Baynes died aged 86 in March 1989.

ALAN MUNTZ & Co LTD
HESTON AIRPORT. MIDDX
DRG. Nº AX 81



DEHLA VIA AUTHOR

JUNKERSARBEIT — QUALITÄTSARBEIT!

smooth operator

The Junkers K 47

By the mid-1920s German aircraft manufacturer Junkers was famous the world over for its "crinkle-cut" transport aircraft, the corrugated-skin concept providing immensely strong, if not particularly aerodynamically efficient, airframes. It was all-change for the company's K 47 two-seat fighter, which saw a move towards smooth-skinning — albeit only partly, as **LENNART ANDERSSON** relates

WELL-KNOWN AS a pioneer in all-metal aircraft design, German aircraft manufacturing company Junkers used corrugated skin to create cantilever fuselage and wing structures that did not need copious struts and wires to prevent them from disintegrating. As speed was not a priority, especially for passenger transports, the drag that these corrugated surfaces created did not matter much in the 1920s. However, When Junkers decided to design its first fighter since the end of the First World War, it was clear that a smooth skin would bring advantages, and streamlining was applied to a degree never seen before on a Junkers type.

A FIGHTER FOR THE TURKS

Junkers' two primary customers in the early 1920s were the governments of the Soviet Union and Turkey, the former acquiring large numbers of J 20 and J 21 two-seaters and K 30 bombers, the Turks procuring J 20s. Subsidiary production factories at Fili, near Moscow, and Kayseri in Turkey had been failures, however, as had efforts to follow those initial achievements. The twin-engined Junkers K 37 and the single-engined K 39 had been developed to meet Turkish requirements but had not been accepted. Instead, Junkers concentrated its design efforts on the development of a two-seat fighter. In April 1927 a preliminary offer was made to Turkey for an aircraft powered by a single Bristol Jupiter VI air-cooled radial engine. More precise requirements were put to paper on May 27, 1927, after which the design phase began.

There were two problems to be addressed. First, a machine-gun on a flexible mount was normally provided for the second crew member in a two-seat fighter, but because of high g- and wind forces, a high-performance aircraft could not be fitted with an ordinary type of gun-mount. Secondly, the engine would have to be supercharged in order to guarantee suitably high performance at altitude.

A trial gun-mount was ready for testing by the summer of 1927, but the second problem was more difficult to solve. If Junkers' own L 55 engine, which offered 690 h.p. for take-off, was to be used, the aircraft's calculated empty weight would rise from 1,560kg (3,430lb) to an unacceptable 2,460kg (5,423lb). The 420 h.p. Bristol Jupiter VII was the only realistic alternative, but the Turkish government demanded a powerplant that could be built domestically, and specified the Pratt & Whitney (P&W) R-1690 Hornet instead.

By February 1928 designations J 47 and J 48 had been assigned to the fighter project. The military version was designated J 47 (also known as K 47), a "civil" variant without armament becoming the J 48 (aka A 48). In May 1928 the construction of a prototype began and structural tests of wing and fuselage sections to destruction followed. The prototype was completed in September 1928 and fitted with a supercharged 480 h.p. Jupiter VII. With a smooth-skinned oval-section fuselage, it looked much more elegant than the more familiar square-angled corrugated-skin Junkers types. The intention of its designer, Hermann Pohlmann, had been to create a two-seater with the performance of a single-seat fighter and it was designed to withstand a load factor of 12g.

A load-bearing corrugated skin was a Junkers trademark, and the design of a smooth-skinned fuselage and tail surfaces proved challenging. It was even more difficult to make a sufficiently strong smooth-skinned wing. Eventually, two sets of wings were built for comparison, one with mainly smooth skin but corrugated on two thirds of the underside, the other completely covered with corrugated skin. Both were tested on the prototype, and, when all factors had been considered, the corrugated-skin alternative was still considered more satisfactory.

A pair of machine-guns (Madsen or Vickers) were buried in the upper decking of the forward fuselage and a single machine-gun was fitted on a special mounting in the rear cockpit. The so-called "cradle" gun-mount had been invented to cope with the forces that the gunner would be subjected to in a manœuvring high-performance aircraft. The mounting, suspended on a pivot with the gunner's seat at one end and the machine-gun at the other, enabled the gunner to operate the machine-gun while sitting down. He could move the gun from 3° to 90° in the vertical plane but only 36° in the horizontal plane. Twin fins were fitted to the type in order to provide good fields of view and fire.

FIRST FLIGHT

On September 29, 1928, Junkers chief test pilot Wilhelm Zimmermann made the first flight of the K 47 at the Junkers factory at Dessau. Testing continued until December, when the machine was dismantled and sent by rail to Limhamn in Sweden for the installation of armament. Established in 1925, Junkers subsidiary AB Flygindustri had been formed at Limhamn in order to facilitate the production and delivery of military and other types of aircraft that could not

OPPOSITE PAGE ***Marking a radical departure from Junkers' patented corrugated Duralumin skin concept, the K 47/A 48 was initially built with a completely smooth skin, although old habits die hard, and production versions incorporated corrugated sections. This A 48, D-2012, was used by the DVL for trials at Berlin-Adlershof from 1930.***

In stark contrast to Junkers' traditional square-angled corrugated skin, the K 47 prototype was given a much more elegant and streamlined smooth skin throughout, although the wings and the tail surfaces of production machines incorporated corrugated skins. Note the original bracing wires linking the wings to the undercarriage cradle and to the pylon between the cockpits.



DEHLA VIA AUTHOR

be built in Germany owing to the rules imposed as a result of the Treaty of Versailles.

On October 25 ,1928, Junkers' press department proudly announced the existence of the new two-seat fighter. Within days the press director had been severely reprimanded for having drawn attention to it. Because of this blunder, information had been made public about a new obviously military aircraft that could not be disguised as a civil type. The use of the Swedish subsidiary eased the situation, however, and with a Swedish registration the K 47 could be advertised as a Swedish-built aircraft.

On November 11 data from the tests at Dessau were sent to Turkey, and ten days later the same info went to Moscow. In its sales efforts, Junkers stressed the advantages that it considered the two-seat type to have; ten K 47s were estimated to possess a fighting capability equivalent to 14 single-seat fighters, and the training of ten gunners would require less expenditure in time and money than the training of four fighter pilots.

At the beginning of January 1929 the prototype was transported to Bulltofta airport at Malmö and, with the temporary identification mark S-80, was inspected and test flown by personnel from the *Deutsche Versuchsanstalt für Luftfahrt* (DVL — German Aeronautical Test Institute). A few days later a Turkish military commission also examined the aircraft and on January 21 it was given the Swedish civil registration S-AABW. During performance tests it reached a speed of 290km/h (180 m.p.h.) and the climb to 5,000m (16,400ft) took 10min.

A wide range of radial engines was offered, including the 480 h.p. Jupiter VII; 450 h.p. Siemens-built Jupiter VI; 465 h.p. P&W Hornet A; 525 h.p. BMW-built Hornet A-2; 450 h.p. P&W R-1340 Wasp; 425 h.p. Armstrong Siddeley Jaguar; 450 hp Lorraine Dietrich and the 500 h.p. Salmson 18AB. Later, Bristol's 520 h.p. Mercury IVS.2 was added to the list because *Flygvapnet* (Swedish Air Force) preferred this powerplant. Ultimately just a few of these engines were tested in the K 47.

Production drawings were completed at the end of April 1929 and the construction of a first batch of ten K 47 b aircraft was started. These differed in several respects from the K 47 prototype: the fuselage was deeper; the rear cockpit was 10cm (4in) wider and the wings had 3° dihedral and straight trailing edges. Underwing struts replaced the prototype's bracing wires and corrugated skin replaced smooth skin on all tail surfaces. The first four were completed in 1929 and production continued with another 18.

The prototype, later re-registered SE-ABW, was

BELOW ***Originally registered as S-80, then S-AABW, and finally SE-ABW, the much-travelled prototype is seen here with underwing struts replacing the original bracing wires, and the specially designed suspended gun mounting in the rear cockpit, which enabled the rear gunner to operate the Madsen machine-gun while seated.***

MATS AVERKVIST VIA AUTHOR





With the retirement of SE-ABW as a demonstration machine, fourth production K 47 SE-ACF (c/n 3355) was used for sales tours to Turkey and Portugal in 1930. Neither, however, placed orders for the type. Note the distinctive corrugated tail-section surfaces.

ARCHIVO HISTÓRICO DEL EJÉRCITO DEL AIRE VIA CARLOS LÁZARO

displayed in Copenhagen, Denmark, in May 1929 before being sent to the Olympia exhibition in London during July 16–27. The following month, purchasing commissions from several countries inspected it at Limhamn. In the autumn, sales tours took it to Finland, Estonia, Latvia, Lithuania, Poland, Czechoslovakia, Hungary, Rumania and Yugoslavia. Negotiations with the Avia company concerning licence-production for the Czech Air Force (as the Avia J-47) proved futile, as was an effort to sell licence rights and a pattern aircraft to Japanese manufacturer Mitsubishi.

STILL NO ORDERS

In Rumania a major fighter aircraft competition was held during July–October 1930, and SE-ABW was sent to compete against four single-seaters — France's Dewoitine D.27 and Morane-Saulnier MS.222, Holland's Fokker D XVI and Poland's PZL P.1. The K 47 attained a maximum speed of 283km/h (176 m.p.h.), but Fokker's D XVI sesquiplane reached 301km/h (187 m.p.h.) with similar power, and was smaller and lighter than the K 47. The latter's main disadvantage was that it cost 30 per cent more than the Fokker and 40 per cent more than the Dewoitine.

With the conclusion of the Rumanian competition, the career of SE-ABW as a demonstration machine was over and it was replaced by the fourth production example, SE-ACF, which had been completed in December 1929. Primarily intended for a demonstration in Turkey, this was originally to be fitted with a P&W Hornet, better suited for lower altitudes. Adapting the aircraft to the Hornet took more time than expected, however, and SE-ACF had to be completed with a Jupiter VII instead.

The aircraft arrived at Eskişehir in Turkey in January 1930, where Junkers company pilot Wilhelm "Willi" Neuenhofen, who had performed most of the previous demonstration flights, test-flew it on February 4. On the 15th the flight programme was interrupted when the engine had to be replaced. This was an embarrassment to the Junkers representative in Turkey and he was told that there was no longer any interest in the aircraft. With a new engine fitted, SE-ACF returned to Junkers at Dessau in August.

In the meantime, another demonstrator was fitted with a 600 h.p. BMW-built Hornet A-2 and was shipped to China, arriving in October 1930. Demonstrations were made at Nanking by Junkers pilot Johann Riszticz from January 1931. In addition, Portugal showed interest in the type and Neuenhofen flew SE-ACF to Alverca, near Lisbon, in November 1930. Portuguese *Inspector da Aeronáutica* da Fonseca lobbied vigorously for the K 47 and proposed re-equipping the entire air force with all-metal aircraft, including some 30 K 47s, paid for by German war reparations. No orders were forthcoming, however. In July 1933 Portuguese pilot Plácido de Abreu asked for a quote for a K 47 that he planned to use for aerobatics; but, curiously, Junkers advised against such a sale because of the type's high price.

Alphabet soup K 47/A 48 variants

SPECIFIC DESIGNATIONS were assigned to different airframe versions and engine installations of the K 47/A 48. A suffix consisting of a lower-case consonant indicated airframe version, and the engine type was indicated by one or more vowels, for example A 48 da.

The prototype was the basic A 48 and there were four variants of the series production airframe — A 48 b, c, d and f. What differentiated the b and d is unknown, but the A 48 c was a project only and the A 48 f was the single-finned version.

The engine types offered for installation were: Jupiter VII with supercharger (no suffix); Hornet (a); Jaguar with supercharger (e); Jupiter VI (i); Wasp (o); Jaguar Major with supercharger (u); Siemens Sh 20 (y) and Jaguar Major GF (ae). **LA**



DEHLA VIA AUTHOR

The A 48 was the "civil" variant of the military K 47, although they were essentially the same aircraft, the A 48 merely being unarmed and with new fuselage decking added around the rear cockpit. This example, D-2012 (c/n 3365), was delivered to the DVL as a test machine in June 1930.

So far the K 47 had attracted an order from just one customer, the Soviet Union, and that deal could not be publicised or used in advertising. Negotiations had been ongoing for some time when a contract for two examples fitted with Gnome-Rhône Jupiter VI 9Af engines and superchargers was signed on April 24, 1929. These were completed in early July and sent to Limhamn. On November 19 Soviet engineer Ganulich signed the preliminary acceptance documents for both.

TO THE SOVIET UNION

Armament trials took eight days and required the firing of 80,000 rounds. The aircraft arrived in Moscow at the *Nauchno-ispytatelnyi Institut V-VS* (NII — Scientific Test Institute of the Air Force) on January 30, 1930. Acceptance tests performed by test pilot Volkovoynov continued until February 13, and two fixed PV-1 machine-guns and a single Degtyaryov DA on a flexible mount were fitted. The final evaluation report stated that the K 47's maximum speed was found to be 273km/h (170 m.p.h.), its service ceiling was 8,100m (26,600ft) and a climb to 5,000m (16,400ft) took 11min 30sec. It was a capable adversary against any aircraft and could effectively take on single-seat fighters, but not modern high-performance fighters, owing to its inferior turn-rate. Furthermore, its firepower in the rear sector was insufficient if the aircraft became involved in a dogfight.

The German authorities had noted the existence of the K 47, but, as long as the nation was forbidden to establish any military aviation, only prototypes could be acquired for secret evaluation at the German test centre at Lipetsk in western Russia. On April 29, 1929, tactical requirements for a two-seat fighter were drafted by the *Heereswaffenamt* (Army Ordnance Office), specifying a maximum speed of 270km/h (168 m.p.h.) at 6,000m (19,700ft) and a climb to 6,000m in 15min.

In October 1929 Junkers initiated negotiations with the German military and a contract for three K 47s powered by a Siemens-built Jupiter VI was concluded. These aircraft were finished at Limhamn and shipped to Leningrad in May 1930. The aircraft were then transported by rail to Lipetsk, where evaluation began of the type's special machine-gun mounting and of the aircraft itself as a two-seat fighter.

One of the aircraft was destroyed on August 20, 1930, when a Fokker D XIII struck its tail during a mock dogfight. The accident caused a security breach when the wife of the gunner, *Rittmeister*

Junkers A 48/K 47 data

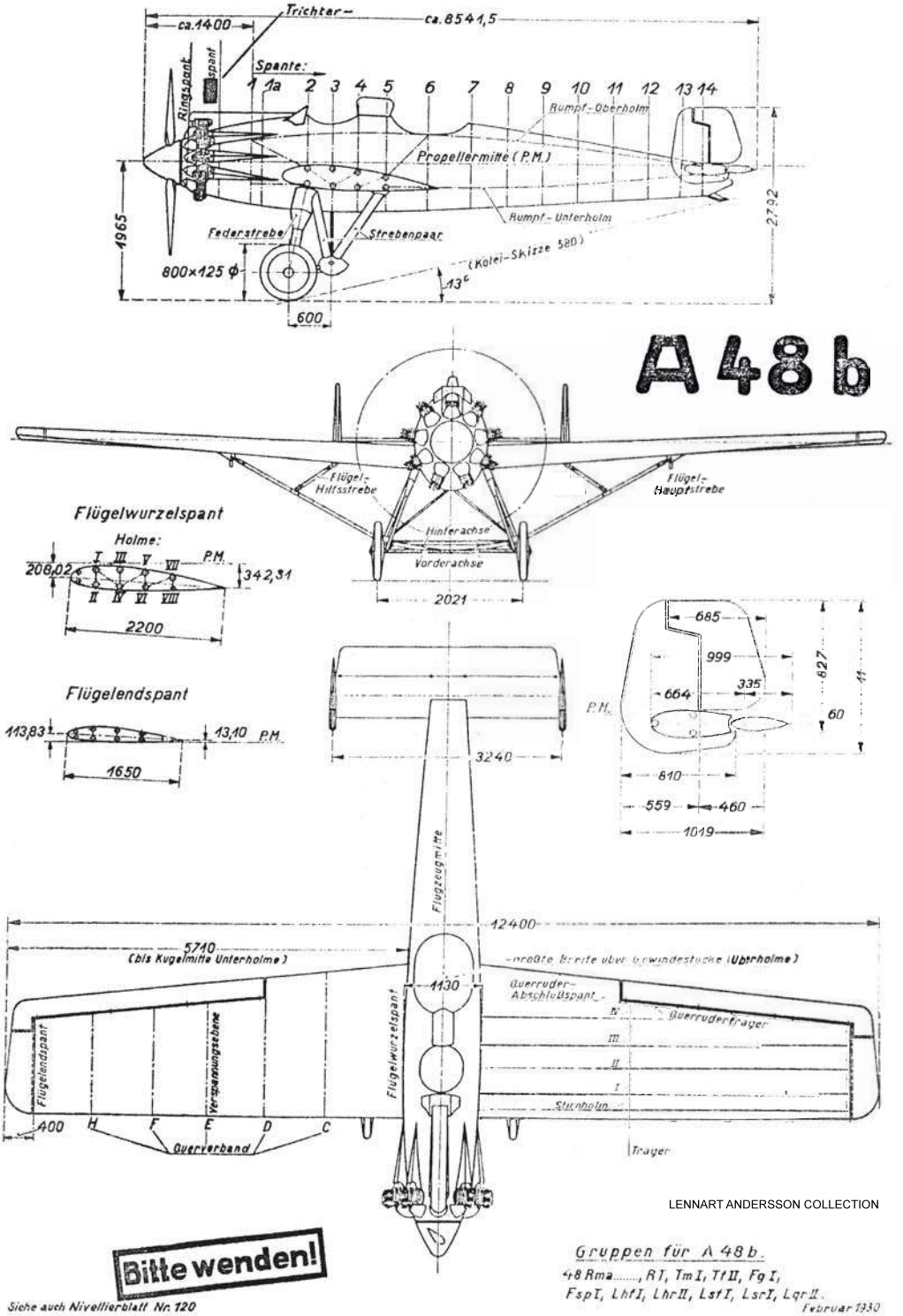
Powerplant 1 x 420 h.p. Bristol Jupiter VII supercharged nine-cylinder air-cooled single-row radial engine driving a fixed-pitch two-bladed prop

Dimensions		
Span	12·4m	(40ft 8in)
Length	8·55m	(28ft 6in)
Height	2·6m	(8ft 6in)
Wing area	22·8m²	(245·4ft²)
Wing loading	71·5kg/m²	(14·6lb/ft²)
Power loading	3·64kg/h.p.	(8lb/h.p.)
Weights		
Empty	1,050kg	(2,315lb)
Loaded	1,635kg	(3,605lb)
Performance		
Maximum speed	290km/h at 3,000m	(180 m.p.h. at 9,800ft)
Cruising speed	245km/h at 3,000m	(152 m.p.h. at 9,800ft)
Landing speed	105km/h	(65 m.p.h.)
Climb to		
1,000m (3,300ft)	2min 12sec	
4,000m (13,100ft)	8min 36sec	
7,500m (24,600ft)	25min 30sec	
Service ceiling	8,400m	(26,600ft)
Endurance	2hr	

Armament
2 x fixed machine-guns, synchronised to fire forward through propeller arc + 1 x machine-gun on a special flexible mounting in rear cockpit

Abmessungen und Bezeichnungen

This original Junkers three-view drawing, entitled* Dimensions and Designations, *is dated February 1930, and shows the leading particulars of the twin-finned Jupiter-engined A 48 b.



LENNART ANDERSSON COLLECTION

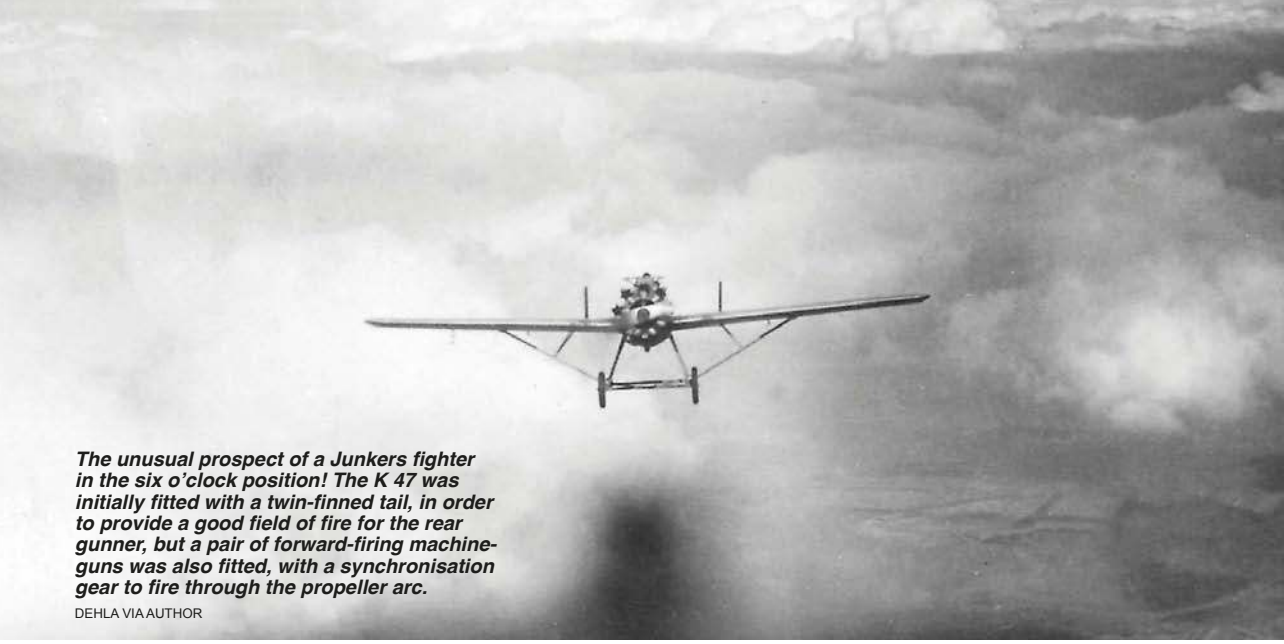
Bitte wenden!

Siehe auch Nivellierblatt Nr. 120

Gruppen für A 48 b.

48 Rma....., RI, TmI, TfII, FgI, FspI, LhfI, LhrII, LsfI, LsrI, LqrII.

Februar 1930



The unusual prospect of a Junkers fighter in the six o'clock position! The K 47 was initially fitted with a twin-finned tail, in order to provide a good field of fire for the rear gunner, but a pair of forward-firing machine-guns was also fitted, with a synchronisation gear to fire through the propeller arc.
DEHLA VIA AUTHOR

Hans Amlinger, who was killed (the pilot had been able to bale out and survived), stated openly that her husband had been killed in a German aircraft "in Russia", which had to be quickly hushed up. A week later Ellen Amlinger boarded a Dornier Merkur passenger aircraft, opened the window during flight and jumped to her death.

The evaluation programme involved numerous mock combats with the D XIII and demonstrated that a biplane offered a better view for the pilot as well as superior manœuvrability. The K 47's cradle gun-mount worked as intended, but the horizontal field of fire was too restricted. A single fin-and-rudder layout was suggested and one of the aircraft was sent back to Junkers in October and modified accordingly. A completely redesigned rear fuselage with a single fin-and-rudder assembly and a new higher-set tailplane was built and fitted.

The aircraft, registered D-1057, was test flown in the early summer of 1931 and took off for Lipetsk from Berlin-Staaken on June 25. It was again used for armament trials, but otherwise both K 47s were relegated to fighter pilot training. Although it demonstrated adequate performance, other factors militated against it and it was removed from the two-seat fighter evaluation programme in favour of the Albatros L 84 (which was also later rejected). Both K 47s remained at Lipetsk until the closure of the station in 1933. When they took off for Germany on August 29 that year, they were among the last aircraft to leave.

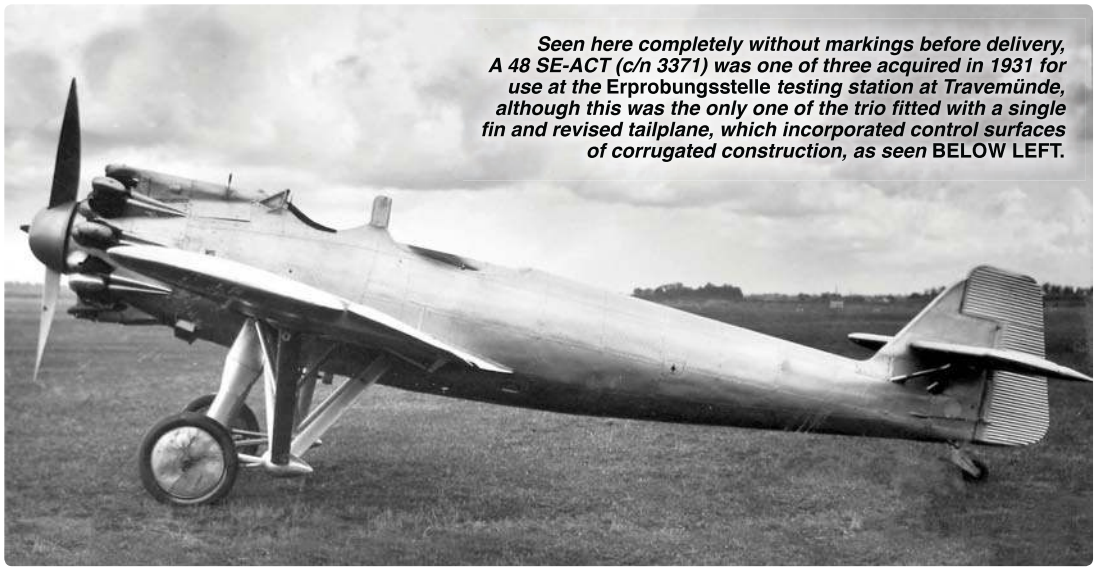
DIVE-BOMBING TESTS

In 1931 three Siemens Jupiter VI-powered "civil" A 48s were acquired by the *Erprobungsstelle* at Travemünde, north-east of Lübeck, a military test station disguised as a civil entity belonging to the *Reichsverband der Deutschen Luftfahrtindustrie* (RDLI — National Association of the German Aircraft Industry). The first of these, a single-finned Jupiter VI-engined A 48 fi (see variants panel on page 109), was given the Swedish civil registration SE-ACT at Limhamn in September 1931 and delivered to Travemünde, where it was given the German civil registration D-2185. Three Siemens-Halske Sh 20 engines were acquired for these aircraft, but it is unlikely they were ever fitted, the other two A 48s also being delivered with Jupiters. One of them, D-2248, had twin fins,

The Lipetsk K 47 evaluation

ACCORDING TO THE Lipetsk evaluation report on the K 47, completed on November 21, 1930, the crew's view was ideal in the upper hemisphere but much restricted downwards. The fixed machine-guns were difficult to reach for the pilot in the case of malfunction. The cradle gun-mount was rated "very good" and the gunner could operate and fire his machine-gun in all flight modes, and when subjected to high g. However, an attacking single-seat fighter could remain outside the rear gunner's field of fire, and it was considered that the gun had to be able to move at least 60° horizontally, not just the 36° allowed by the twin fins.

A large number of mock fights with a Fokker D XIII biplane showed that, owing to its superior agility and climb rate, the Fokker fighter was able to pull the K 47 into a dogfight almost every time. The aircraft were on relatively equal terms if the K 47's rear gun was used offensively and not just for defence — as long as the Fokker could not get beneath the K 47, in which case the K 47 was "shot down". This also happened frequently when it met more than one single-seat fighter. Unlike the other two-seat fighter contenders, the Albatros L 84 and Dornier Do 10, the K 47 had not been designed in accordance with any German military specification. Perhaps more crucially, it was also considered too expensive. **LA**



AUTHOR'S COLLECTION

***Seen here completely without markings before delivery, A 48 SE-ACT (c/n 3371) was one of three acquired in 1931 for use at the* Erprobungsstelle *testing station at Travemünde, although this was the only one of the trio fitted with a single fin and revised tailplane, which incorporated control surfaces of corrugated construction, as seen* BELOW LEFT.**



DEHLA VIA AUTHOR

but the third machine was a single-finned model that was destroyed in a crash at Travemünde before it could receive a registration.

Around this time the *Reichsmarine* (German Navy) took an interest in dive-bombing, attracted by the potential for an aircraft to sink a major warship if it could drop a large enough bomb with a sufficiently high probability. On February 18, 1932, tactical requirements for a land-based dive-bomber were issued, although this was regarded by the Navy as an experimental and not an operational requirement. As few aviation records from the Reichsmarine survive, little is known about this, but the "K 47 III" was mentioned in a bomber-development programme of 1933, and new tactical requirements were drawn up for a dive-bomber with a maximum speed of 275km/h (171 m.p.h.), a bomb load of one 250kg (550lb) or one 500kg (1,100lb) bomb, and the ability to dive at angles of up to 90° to the horizontal. It is worth noting that at this time the *Reichswehr* (German Army) still had no requirement for a dive-bomber.

Interestingly, Junkers had already been experimenting with dive-bombing techniques as a semi-private venture. Ernst Zindel, Junkers' chief designer, later reported that work on the dive-bombing concept started as early as 1930, long before the idea was accepted by the military. With its exceptional sturdiness and good handling, the A 48 was found to be a suitable test vehicle for the development of dive-bombing sights and airbrakes. Initial trials were organised as a co-operative effort between Junkers, Swedish armament manufacturer Bofors, Flygvapnet and Finland's *Ilmavoimat* (Finnish Air Force). Bofors produced the bombs, Flygvapnet supplied the searchlights, ground radio equipment and measuring instruments and Ilmavoimat supplied the bomb racks, which were attached to the wing struts of K 47 SE-ADL, which, fitted with a 525 h.p. BMW Hornet A-2, had previously been used for a demonstration in Finland in November 1932.

Willi Neuenhofen was detailed to fly the aircraft for the dive-bombing trials, which took place at Bofors' shooting range near Karlskoga in February 1933. Dives were initiated at 3,500m (11,500ft), after which bomb release took place at 2,000m (6,500ft), diving angles never exceeding 70°. The registered results were recalculated to correspond to the planned operational release



Seen here fitted with a BMW Hornet A-2 engine, A 48 c/n 3362 started its career at the German test centre at Lipetsk in the Soviet Union in June 1930. It was later registered as D-1057, before another spell at Lipetsk and its final return to Germany as D-INUT, as which it was used by the* Deutsche Verkehrsflieger-Schule *(DVS — German Air Traffic Pilots' School) as a trainer at Schleissheim.

DEHLA VIA AUTHOR



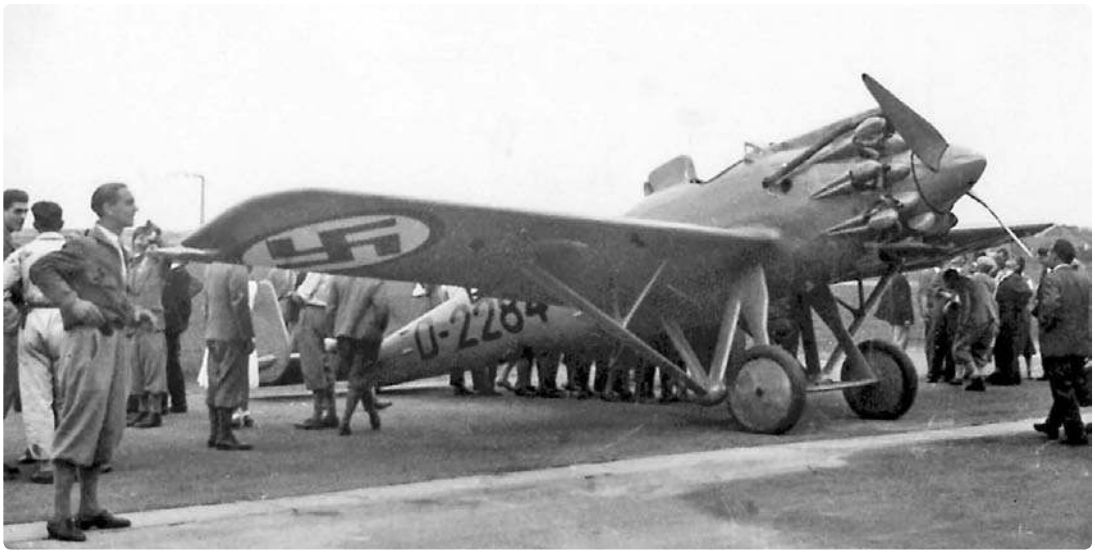
DEHLA VIA AUTHOR

LEFT ***With a Townend-type ring-cowling fitted to its BMW Hornet engine, A 48 demonstration and trials machine D-2284 (c/n 3355) displays its underwing-mounted dive-brakes. With its sturdy construction and good handling characteristics, the type proved valuable for research into the nascent art of dive-bombing.***

BELOW ***The original Stuka? Hornet-engined development K 47/A 48 SE-ADL (c/n 3356) was equipped for dive-bombing trials at Bofors' shooting range in Sweden with underwing bomb-racks provided by Finland's Ilmavoimat and measuring equipment, as seen here on the undercarriage struts.***

AUTHOR'S COLLECTION





AUTHOR'S COLLECTION

ABOVE ***Fitted with a Bristol Jupiter VII engine, A 48 D-2284 (formerly demonstrator SE-ACF) is seen here during the 1932 election campaigns for the*** **Nationalsozialistische Deutsche Arbeiterpartei** ***(Nazi Party), during which it wore swastikas on the undersurfaces of the outer wing sections. These were only temporary markings, however.***

altitude of 800m (2,600ft). The Junkers-designed bombsight consisted of two rings, which the pilot centred on the target after having made adjustments for the estimated diving angle and release height.

The K 47 proved that it was suited for the task and the next step was to develop instruments and procedures for more exact measurements of the factors that influenced the accuracy of aim. A second test-run followed in August the same year. This time D-2284, formerly SE-ACF, was used for trials at Rinkaby airfield in southern Sweden. The bombs were released at 800m, hits averaging 29m (95ft) off target-centre. It was estimated that 60 per cent of the bombs would have hit the target had it been a ship 220m (720ft) long and 30m (100ft) wide.

Nothing is known of the third test-run, but the fourth took place at F 4 Frösön Air Force base, near Östersund in northern Sweden. Flygvapnet was by this time taking a keen interest in the dive-bombing concept, and a special temporary test group had been set up at Frösön with three Hawker Harts at the end of July 1934. Junkers personnel and SE-ACF arrived there at the end of August and started to test a modified sight, as well as examine the effects of wind on dive-bombing and evaluate the so-called "rocket bomb" designed by Bofors for use against armoured targets. The precision achieved this time was ±7m (23ft) and more than 50 bombs, including eight rocket bombs, were dropped. Neuenhofen celebrated what had been achieved by dropping dummy bombs on a small field near the residence of the F 4 Wing commander.

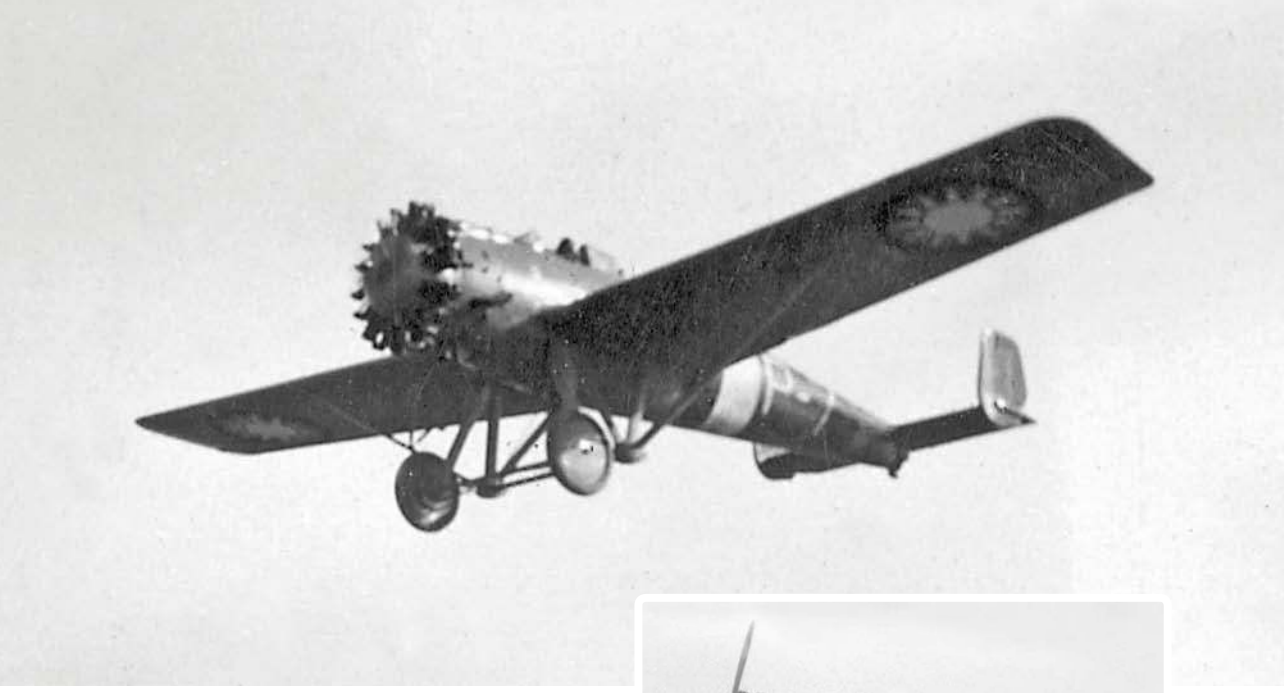
After the Nazi party's rise to power in 1933, military testing and development could be undertaken in Germany, and dive-bombing tests were included in the 1934 bomb-development plan. In April and May that year tests were made at Jüterbog in north-eastern Germany with a Heinkel He 50, the Luftwaffe's first standard dive-bomber. An A 48, probably D-2284, was hired from Junkers for ballistic tests and equipment tests, and was fitted with two electrically operated ETC 50/VIII bomb racks, dropping a total of 84 x 50kg (110lb) C50 bombs in 42 dives.

"STUKA" DEVELOPMENT

Three types of dive-bombing sights (*Sturzbombenvisier* or "Stuvi") were ordered by the *Reichsluftfahrtministerium* (RLM — National Aviation Ministry), primarily for the He 50. These were the SAM S1, Zeiss Z1 and Askania A2. An earlier version of the Askania sight had been used in the spring 1934 dive-bombing trials and the improved Askania A2 was tested at Jüterbog in November. As only one He 50 was available, the A 48 was hired again and fitted at Dessau with two ETC 50/VIIIb bomb racks, an Askania A2 bombsight and other equipment. After the tests, the bomb rack was declared operationally ready.

In October 1934 work on the development of an operational dive-bomber started in the RLM's *Technisches Amt* (Technical Office). Famed German aviator Ernst Udet was engaged as an adviser to help define tactical requirements, which were then to be translated into technical conditions that could be issued to industry. An aircraft-development programme drafted in February 1935 contained two light *Sturzkampfflugzeug* (dive-bomber, or "Stuka") types — the Hamburger Flugzeugbau Ha 137 and Henschel Hs 123 — and three heavy Stuka types: the Junkers Ju 87, Arado Ar 81 and Heinkel He 113.

Single-finned A 48 example D-2185, originally



DEHLA VIA AUTHOR



AUTHOR'S COLLECTION

ABOVE ***Six BMW Hornet-engined K 47s were ordered by the Nanking government in China in May 1931, which, with the purchase of the example sent the previous year, were given the serials P-1 to P-7, the last of which is seen here.*** **RIGHT** ***Junkers test pilot Johann Riszticz (right) beside the first of the Nanking government's K 47s, which arrived in October 1930.***

SE-ACT, re-registered D-IKEF in 1934, remained at Travemünde and was used until at least 1937 for various trials with dive-bombing sights, turbines and other instruments. The only A 48 retained by Junkers after 1933, D-2284, was re-registered D-ITOR and used for development tasks, including work during 1933–34 on a device intended to prevent the pilot from pulling more g than the airframe could withstand, by artificially increasing stick forces without impeding the manœuvrability of the aircraft within its permissible envelope. A mass-balanced auxiliary tab fitted to the trailing edge of the elevator was found to be the best solution, but flutter problems prevented further development.

One A 48, D-2012 (later D-IRES), had been delivered to the DVL at Berlin-Adlershof in June 1930. As the type was renowned for its structural strength and ability to withstand high-speed dives, it was used for several research programmes, including the measurement of acceleration forces during aerobatics. When the DVL's flight training section moved from Berlin to Braunschweig-Völkenrode in May 1938, the A 48 was still on its aircraft inventory.

IN ACTION IN CHINA

The only country to use the K 47 operationally was China. As already mentioned, one example was shipped from Limhamn in October 1930 for demonstrations to Chiang Kai-shek's Nationalist government in Nanking (now Nanjing) by Junkers pilot Johann Riszticz. This machine was subsequently purchased, with six more ordered in May 1931, Riszticz being engaged for the conversion training of Chinese pilots. He was fired after only ten days, however, when the K 47 crashed with a Chinese pilot at the controls and himself in the rear cockpit, despite the cause being engine failure. Nobody was hurt and German mechanic Boehler later repaired the aircraft.

The six K 47s of the Chinese order were shipped from Limhamn on June 4, 1931, and arrived at Shanghai on July 17. The first example was assembled and test flown on August 3. By this time the Nanking government had discovered that the semi-independent separatist Canton government in southern China had ordered a batch of three K 47s on May 13. These three machines, which departed Hamburg aboard the *SS R.C. Rickmers* on July 4, differed slightly from those ordered by Nanking in being equipped with superchargers. When they arrived at Shanghai on August 22, they were immediately confiscated by customs officers, together with 600 machine-guns and ammunition. The Nanking government paid for



DEHLA VIA AUTHOR

ABOVE ***German flying instructors Erich Brammen (fifth from left) and Hermann Frommherz (second from right) enjoy a pause in activities during the training of Chinese K 47 pilots in late 1931. The Chinese K 47s sported the Nationalist roundel, based on the Kuomintang's symbol incorporating a white sun with 12 cantons on a "blue sky" field, with a red outer ring.***

the aircraft and the Junkers representative was happy to deliver to Nanking instead!

On August 22, while a fighter squadron was in the process of being formed at Nanking, Riszticz crashed again in one of the first six examples, and the Chinese pilots refused to fly the type. German pilots Erich Brammen and Hermann Frommherz were then engaged for seven months to resolve the situation and train the Chinese pilots. The K 47s were stationed on the military aerodrome at Chengchow (now Zhengzhou) from December 1931 and formed the Pursuit Squadron. When a military parade was held in Nanking, the K 47 squadron flew in to participate in the air display, and the Junkers representative in China reported home that he had heard Chiang Kai-shek, who was present on the occasion, say that the Junkers squadron was "the best in the whole air force". On January 10, 1932, Erich Brammen was killed when a low-flying aircraft hit him in the head while he was sitting in the cockpit of a K 47.

In 1932 a report was prepared by Junkers based on experience gained during the so-called Shanghai Incident, in which the Japanese attacked the city during January–March that year. According to the report, the Chinese Nationalist Air Force was numerically inferior to the Imperial Japanese Navy Air Force and lacked centralised leadership. Both sides employed mostly single-seat fighters and two-seat observation and bombing aircraft, and the eight K 47s present constituted the majority of Chinese fighter assets in the area. Japanese aircraft took off from a new airfield north of Shanghai and from the aircraft carriers *Kaga* and *Hōshō*.

With the opening of hostilities, the Chinese Pursuit Squadron was disbanded and a pair of K 47s was instead attached to each observation squadron. A bombing mission with Douglas O-2MC and Vought O2U-1 Corsair biplanes was escorted by two single-seat fighters and a pair of

Three Chinese K 47s await their next sortie, including, nearest the camera, demonstrator c/n 3356, originally SE-ADL. This was acquired and donated to the Nationalist Air Force by the T'ien C'hu Seasoning Powder Factory, whose name was painted on the fuselage aft of the rear cockpit, as seen here.

CHINA'S WINGS VIA AUTHOR



K 47s, one of the pilots of the latter managing to shoot down a Japanese single-seat fighter. One of the Chinese single-seaters was also shot down and the pilot of the other, which was damaged by Japanese aircraft, managed to make a forced landing. During a Japanese attack on February 22, 1932, both sides lost a single-seat fighter, while all two-seat aircraft returned without losses.

Four days later 30 Japanese aircraft attacked the Chinese airfield at Hangchow (Hangzhou) and on their way back six Japanese single-seat fighters attacked another Chinese aerodrome near the city. A three-aircraft formation of Corsair and Waco 240A aircraft and two K 47s tried to take off during the attack, but two of the observation aircraft were immediately forced to land. The pilot of one of the K 47s was wounded during take-off and had to land again, but the aircraft was quickly repaired. One Japanese fighter was damaged and crashed into the sea.

The Junkers report is clearly biased, its main purpose being to prove the superiority of a two-seat fighter over a single-seater. Its author maintains that the Japanese pilots repeatedly flew into the field of fire from the K 47's rear machine-gun without understanding the attendant danger. The conclusion was that the K 47 was a successful fighter and, although it could not be used as an interceptor, it was still superior to the single-seat fighter in most respects. In truth, as we have seen, German and Soviet evaluations had already proved otherwise.

In 1933 at least five K 47s were transferred to the Central Aviation School at Hangchow, and the flying school at Luòyáng also later acquired K 47s. In the meantime, Junkers agent Siemsen & Co managed to sell SE-ADL to the Nanking government, to which it was delivered in July that year. The T'ien C'hu Seasoning Powder Factory sponsored the purchase of the aircraft and presented it to the Air Force with the name *T'ien C'hu* painted in Chinese on the fuselage. Unfortunately, during the presentation ceremony at Hangchow it crashed and had to be sent back to Germany for repairs. By 1934, however, it was back in China and on March 18 that year was handed over again to the Air Force. The final fate of these aircraft is not known.

In January 1932 a final batch of five K 47s had been laid down at Dessau; but, as further orders were not forthcoming, work on them was discontinued after only a short time. These airframes were later scrapped and the total number of completed aircraft was 23.

Junkers A 48/K 47 production

C/n	Comments
3351	Prototype, demonstrator; to the *Deutsche Verkehrsflieger-Schule* (DVS — German Air Traffic Pilots' School), reg'd S-80, S-AABW, SE-ABW, D-IGER
3352	To Soviet Union, December 1929
3353	To Soviet Union, December 1929
3354	Test and development (reg'd D-IBOS)
3355	Demonstrator and development aircraft (SE-ACF, D-2284, SE-ACF, D-ITOR)
3356	Demonstrator and development aircraft. Delivered to China, July 1933 (reg'd SE-ADL, *"T'ien C'hu"*)
3357	Demonstrator in China, sold circa May 1931
3358	To China, July 1931
3359	To China, July 1931
3360	To China, July 1931
3361	To Lipetsk, June 1930
3362	To Lipetsk, June 1930; to DVS (reg'd D-1057, D-INUT)
3363	To Lipetsk, June 1930; to DVS (reg'd D-2532, D-IPOS)
3364	To China, July 1931
3365	To DVL, June 1931 (reg'd D-2012, D-IRES)
3366	To China, July 1931
3367	To China, July 1931
3368	To China, August 1931
3369	To China, August 1931
3370	To China, August 1931
3371	To RDL, 1931 (reg'd SE-ACT, D-2185, D-IKEF)
3372	To RDL, 1931 (reg'd D-2248, D-ILUS)
3373	To RDL, 1931 (Not registered)

Total built 23

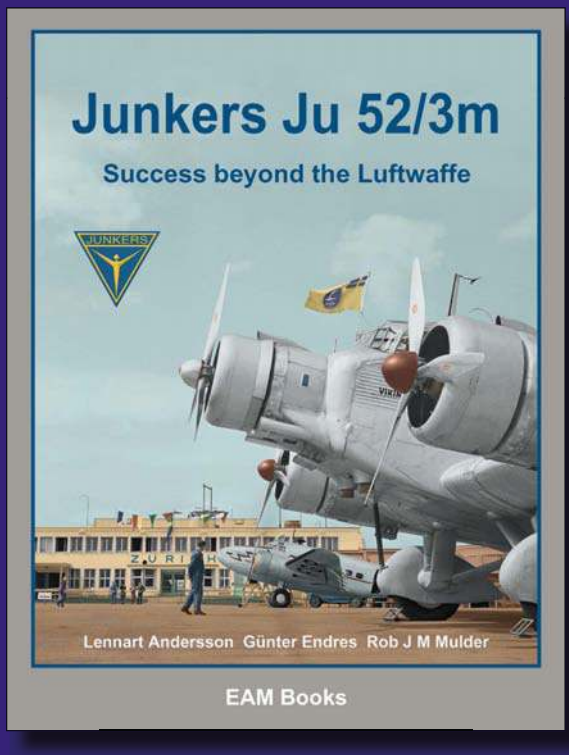
3374–3378 Construction cancelled in 1932

BELOW ***Despite being completely obsolete by the mid to late 1930s, at least three examples of the A 48/K 47 survived into the 1940s and received Luftwaffe*** **Balkenkreuz** ***markings and codes, as seen on this BMW Hornet-engined example. The type's designer, Hermann Pohlmann, refined the dive-bomber with his famous Ju 87 Stuka.***

AUTHOR'S COLLECTION



NEW BOOK:
JUNKERS JU 52/3m
Success beyond the Luftwaffe



The three-engined Ju 52/3m is one of few aircraft that can lay claim to 50 years of active service, with a few still flying, demonstrating not only its longevity, but also the soundness of its design and construction. While fulfilling the Luftwaffe's operational strategies, largely as a transport and makeshift bomber, it also served major commercial air routes in many parts of the world, since entering service with Deutsche Lufthansa in 1932, and was also adapted for many other missions. Production was re-activated after the war in France and Spain, and a total of almost 5,400 has been built.

Our Junkers books, from the F 13, to the W 33/W 34, G 24/G 31, and now the Ju 52/3m, provide the reader with deep insight into the design, construction and operation of aircraft that have contributed greatly to the development of aviation, both in the civil and military fields. Hostile terrain, extremes of weather, and vast distances have been challenges successfully met. All have truly been pioneers. More than forty years of gathering information and in-depth research will provide the reader with a wealth of data, photographs, and colour drawings of the iconic Ju 52/3m.

About the book: 21.6 x 27.9 cm, 416 pages, hard covers, around 445 photos, tables and production lists. Colour section with profiles, colour photographs and philately appendix.

Price: £ 35.00 + postage & packing

ORDER YOUR COPY: WWW.EAMBOOKS.COM

GÜNTER ENDRES - LENNART ANDERSSON - ROB MULDER



ARMCHAIR AVIATION

We take a look at what's available for the aviation history enthusiast in the world of books and other literature, from hot-off-the-press publications to reissued classics

Wright Brothers, Wrong Story: How Wilbur Wright Solved the Problem of Manned Flight

By William Hazelgrove; Prometheus Books, 59 John Glenn Drive, Amherst, New York 14228, USA; 6¼in x 9¼in (160mm x 235mm); hardback; 288 pages, illustrated; £18.17 (from Amazon UK). ISBN 978-1-633884-5-88

WILLIAM HAZELGROVE'S contribution to "post-truth" literature, this book is aptly named, although not for reasons the author would admit. In his book, Hazelgrove asserts that Wilbur Wright was the one and only genius behind the invention of manned flight; indeed, his brother Orville was just an aviation "groupie". To support this view, he reveals that Orville conspired with biographer Fred C. Kelly, who wrote *The Wright Brothers* (Harcourt Brace, 1943) 30 years after Wilbur died. According to Hazelgrove, Orville manipulated Kelly to promote himself as an equal partner in his brother's quest, successfully hoodwinking every historian who studied the event thereafter.

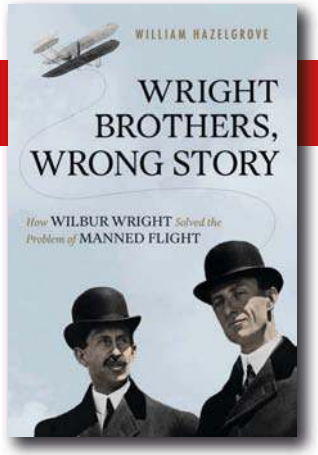
It is hardly a new idea. In 1975 biblical scholar John Evangelist Walsh first proposed it in *One Day at Kitty Hawk: The Untold Story of the Wright Brothers and the Airplane* (Ty Crowell Co, 1975). There are some differences. Walsh tells us that Kelly portrayed Wilbur as a "shadowy" figure; Hazelgrove says he was "fuzzy". Skimming both books side by side, you get the shadowy, fuzzy impression that *Wright Brothers, Wrong Story* has a high percentage of recycled material.

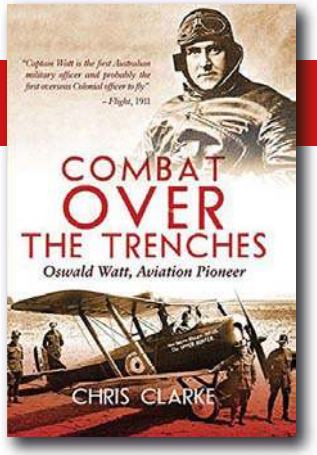
What Hazelgrove brings to his telling are the methods of disinformative journalism. Any fact that runs counter to his theme becomes "lore", thereby reducing accepted history to mythology. Troublesome evidence is ignored completely. He refers to "Some Aeronautical Experiments", a speech Wilbur gave to the Western Society of Engineers in 1901, alleging that this work was driven by Wilbur alone. He skips over the seventh paragraph, in which Wilbur himself shoots Hazelgrove's hypothesis down: "My own active interest in aeronautical problems dates back to the death of [Otto] Lilienthal in 1896 . . . my brother soon became equally interested. We soon passed from the reading, to the thinking, and finally to the working stage".

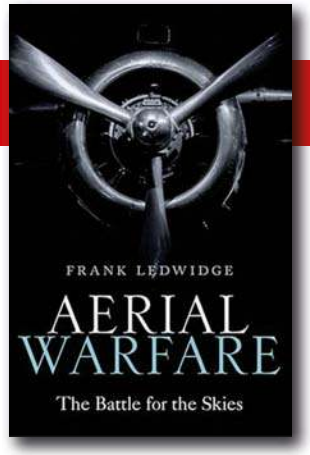
This new tome relies on the innocence of its audience to mask these manipulations and omissions. Hazelgrove tells us that in Kelly's book Orville claims to have originated the concept of wing-warping, the method by which the Wrights controlled their aircraft. But if you consult *The Wright Brothers* — and Hazelgrove is betting that you won't — Kelly records Wilbur making six separate contributions to the evolving concept, while Orville, who was dictating the story, made three.

As the facts don't support Hazelgrove, he compensates with incessant repetition. He underscores every time Wilbur does something without Orville and neglects to explain the circumstances. He ends the chapter in which the Wright brothers build their first glider with a heavy-handed sentence, stating: "He [Wilbur] was going [to Kitty Hawk] alone". What we are not told is that Orville stayed behind to wrap up their bicycle shop while Wilbur scouted where they might fly.

Throughout the book, Hazelgrove misrepresents Orville's mindset during the time he worked with Kelly. Orville was not conspiring to enlarge his historical footprint; he was frantic that history would diminish the accomplishments of both brothers. For almost 30 years, the younger Wright had been locked in a struggle with the USA's Smithsonian Institution, which insisted that Samuel Pierpoint Langley, its late Secretary, had invented the first true aeroplane. Langley had attempted to fly shortly before the Wright brothers in 1903 and failed miserably. *[See the reviewer's article on the subject,* Politically Incorrect, *in TAH11 — Ed.]* The success of the Wrights humiliated the Smithsonian and diminished it politically, so the "Smith" insisted that Langley's "Aerodrome" was nonetheless







the first machine "capable of flight". The Smith used its considerable authority to assert its own version of history, while Orville stubbornly defended his and Wilbur's achievement. Kelly negotiated the peace treaty that ended this war, and published it as the last chapter in *The Wright Brothers*. Hazelgrove's story is just wrong.

NICK ENGLER

Combat over the Trenches: Oswald Watt, Aviation Pioneer

By Chris Clarke; Pen & Sword, 47 Church Street, Barnsley, South Yorkshire S70 2AS; 6¼in x 9¼in (152mm x 235mm); hardback; 306 pages, illustrated; £25. ISBN 978-1-526715-01-2

THIS IS A praiseworthy biography of Australia's first military pilot. After learning to fly with the Bristol School on Salisbury Plain in the UK in July 1911, Oswald Watt became an adviser on aviation matters to the Australian Department of Defence and pressed for the country to undertake aeroplane manufacture.

By early 1914 he was flying his own Blériot monoplane at Heliopolis in Egypt. He then went to fly with the Blériot establishment at Buc, near Paris, and when war broke out he offered himself and his aeroplane for French military service. He next moved to No 1 Sqn Australian Flying Corps (AFC) in the Australian Imperial Force, which became part of the Royal Flying Corps, serving in Egypt with B.E.2cs, and subsequently commanded No 68 (Australian) Sqn (No 2 Sqn AFC).

Early in 1917 the unit moved to England to train up on D.H.5s, then moved to France in September and began to receive S.E.5as in December. Watt took command of the AFC training wing in England in early 1918.

Returning to Australia after the Armistice, Watt became president and spokesman of the Australian Aero Club, promoting the development of aviation. Then, on May 21, 1921, tragedy struck when he was drowned in a swimming accident in Bilgola Bay.

In presenting his very thorough account of Watt's life the author corrects numerous errors committed hitherto, sets the record straight and endeavours to resolve vagaries. In addition to an abundance of monochrome illustrations, there is thorough referencing of sources, a comprehensive bibliography and a good index.

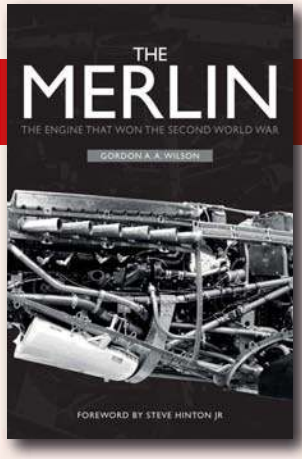
PHILIP JARRETT

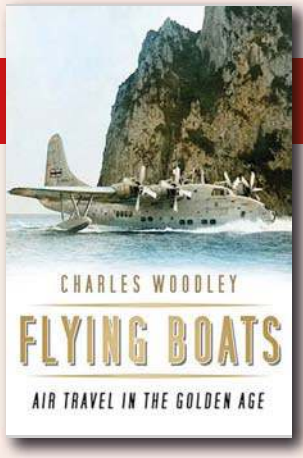
Aerial Warfare: The Battle for the Skies

By Frank Ledwidge; Oxford University Press, Great Clarendon Street, Oxford OX2 6DP; 5¼in x 8in (135mm x 200mm); hardback; 184 pages; illustrated; £12.99; ISBN 978-0-198818-13-7

COVERING MORE THAN a century of aviation history and air-power theory on a global scale in little more than 160 pages of text is an onerous challenge — doubly so when writing for an august academic press, and trebly so when lecturing on law and strategy at Cranwell.

After introducing the "foundations" of air power, the author proceeds through seven chronological chapters, two of which are devoted to the Second World War in the West and the Pacific, and wraps up with a look into the future (*Per Ardua ad Astra?*); five boxes distributed throughout the text cover the four roles of air power; Boelcke's principles of air-to-air combat; Guernica; the 7·6 million tons of bombs dropped on Vietnam and the 1981 Israeli air raid that destroyed the Osirak reactor (and Iraq's hopes to produce a nuclear weapon). *TAH* readers will find few narrative surprises, including the open scepticism for the "victory through air power" claims made by Giulio Douhet, Billy Mitchell, Hugh Trenchard and Alexander de Seversky. The author favours a predominantly tactical use







of aircraft, subservient to surface operations which — recent experience notwithstanding —- he implies deliver greater results.

Ledwidge blames air power for failing to ensure "a satisfactory political result" in Libya, but conveniently omits to ask about misguided French ambitions and naïve intelligence that led to the 2011 attack. Similarly, his argument about the ineffectiveness of air power is considerably undermined by the omission of the significant contributions to the independence of Poland (during the so-called "miracle on the Vistula" in mid-August 1920), the Italian repression of insurgency in Libya — including the 1930 strikes against bases 400 miles (640km) into the desert — and the conquest of Ethiopia (resupplying army columns invading through the otherwise impassable southern desert). In the same vein, the Nieuport IV monoplane on page 13 is not "diving on Turkish troops" but making an emergency landing, which on September 10, 1912, caused Captain Riccardo Moizo to become the first pilot PoW — in itself an interesting point to raise in a discussion.

The three-page bibliography omits, among other things, the great interdiction theorist John Slessor and air power historians such as Phil Meilinger and John Morrow. In addition to raising more than an eyebrow, this certainly limits its value as a starting point for independent research, a primary goal of any such overview.

Aircraft designations do not make history, but historians are expected to be familiar with their field and its conventions. Regrettably, many are botched. To mention but a few, the Mustang is cited as both P51 and P-51 on consecutive pages, the ubiquitous Bell Huey is referred to as the HU-1 during the Vietnam war (in 1962 McNamara had already made it the UH-1), and the AWACS appears as EC3A on page 110 before mutating into a more credible E-3A on page 144.

While there is certainly a need for an authoritative compact primer about the military use of aviation, *Aerial Warfare* reads more like lecture transcripts laced with trendy questions about the need for independent air forces.

GREGORY ALEGI

The Merlin: The Engine That Won the Second World War

By Gordon A.A. Wilson; Amberley Publishing Ltd, The Hill, Merrywalks, Stroud, Glos GL5 4EP; 6in x 9¼in (156mm x 235mm); hardback; 272 pages; illustrated; £18.99. ISBN 978-1-445656-81-6

FORMER MILITARY PILOT Gordon Wilson adds to the roster of books on the Rolls-Royce Merlin engine, his aim being to provide the "first ever narrative history of the famous aero-engine that powered the Spitfire". This handsomely designed medium-format hardback includes a selection of attractive full-colour photographs in the middle of the book, including several modern images of Merlins being restored — an unusual and welcome addition.

The main text is divided up into five sections, making up a total of of ten chapters in roughly chronological order, from the birth of Rolls-Royce in 1904 to the end of the Second World War and beyond. In the first 60 pages there is plenty to enjoy in the descriptions of the lives of the company's founders, although much of this early material by necessity covers purely automotive developments.

After this entertaining start, however, the book goes on to devote three pages to the development of radar, before proceeding with a discussion of the Boeing 787 Dreamliner. There is also a lengthy section detailing crankshafts and other engine components, yet without any illustrations for the novice, nor detail enough in the text to interest the seasoned enthusiast.

WINGLEADER

Edited by Mark Postlethwaite; 11¾in x 8¼in (297mm x 210mm) landscape format; 48 pages, illustrated; published monthly by Wing Leader Ltd; digital download edition free, print subscription for four quarterly compendium issues £60. Website www.wingleader.co.uk. Telephone +44 (0)116 340 1085

LAUNCHED IN AUTUMN 2018 with a crowdfunding campaign, this new magazine is the brainchild of renowned aviation artist Mark Postlethwaite, aviation archæologist and publisher Simon Parry and web developer Wesley Cornell. Its digital edition is available free of charge, while print versions are available for a subscription fee — as such, it represents a new and unusual business-model in the aviation-history market. Visually-led, with lavish use of large photographs, paintings and graphics, it nevertheless contains a few reasonably in-depth items. Issue No 1, published in January 2019, opened with a Bristol Blenheim kit-build and historical illustrations of the subject aircraft and its sisters. An interview with artist Nick Trudgian, archive photographs of a Handley Page Halifax, an extract from Brian Rivas's book *A Very British Sound Barrier* and an album of de Havilland D.H.108 pictures completed the package. At time of writing, Issue No 3 is available, featuring a mix of World War Two and World War One-era subjects. Take a look online — you have nothing to lose. **MO**

The book regains its pace at Chapter 8, on the Mustang, which offers some good insights into the operational development of this exceptional aircraft. Just as the reader starts to become entranced, the narrative turns to the shadow factories and Packard variants. This confuses the timeline greatly, as much of this material dates from many years before the development of the Mustang. This lack of a coherent timeline is a serious flaw in the editing of this book.

The exclusion of any archival references in the appendix is to be regretted, as is the inclusion of nearly 20 pages on the post-war activities of Rolls-Royce and the jet engine, neither of which add value to the subject in hand.

This can be seen as a useful addition to the devout enthusiast of all that is Rolls-Royce — but contains very little technical detail about the Merlin itself, and in terms of the human story offers little material about the war years, the bulk of which is expended in the introductory sections. Rather than a rewrite, the book would be better served by being re-titled. *An Operational Overview of the Genesis of the British Military Aviation Industry and the Impact of the Merlin Engine* would both please the prospective reader and be a more accurate reflection of its contents.

CALUM DOUGLAS

Flying Boats: Air Travel in the Golden Age

By Charles Woodley; The History Press, The Mill, Brimscombe Port, Stroud, Glos GL5 2QG; 6in x 9¼in (156mm x 234mm); softback; 192 pages, illustrated; £17.99. ISBN 978-0-750970-14-3

FLYING-BOAT AIRLINERS have experienced a chequered history, with early success and ambitions for growth dashed by the advent of the Second World War and the subsequent fighting of a losing battle against a rising tide of indifference from the major airlines in the post-war world. Although increasingly reduced to niche operations, some aircraft continued to soldier on until the early 1960s, by which time they were well beyond their "sell-by" date. Despite these highs and lows, an aura of luxury and adventure persists around their chapter in the development of global travel, and it is this that forms the basis for this book.

The story here begins in the mid-1930s, when generous government subsidies to carry air mail throughout the British Empire catalysed the development of the Short Brothers family of Empire Flying Boats for Imperial Airways; a leap in sophistication that was mirrored across the Atlantic by Pan American's quest for expansion along the east and west coasts of America to the Caribbean, South America, Hawaii and beyond, for which they placed orders for equally capable "Clippers" from Sikorsky and Martin.

The author tackles the abrupt termination of many routes on the outbreak of war; the requisitioning of the Imperial fleet for military service; the story of the vital role they played in maintaining communication around the globe— and the price that was paid. Post-war, the focus is on the few airlines that operated flying-boats produced by Short Bros, of which the majority were converted from surplus military stock.

The emphasis throughout is on the experience of the passengers travelling along these routes rather than on the technology, politics and commercial issues behind the ventures. For Imperial this began with dedicated Pullman trains, quality hotels, fine dining and aircraft cabins kitted out to the highest standards that weight would permit. This could not be sustained after the war and the luxury was slowly pared back. The text includes much interesting detail; anecdotes, passenger diaries, timetables, menus and so on to enrich the story, and appendices on the ultimate fate of all the flying-boats. It is an interesting read.

RALPH PEGRAM

BOOKS IN BRIEF

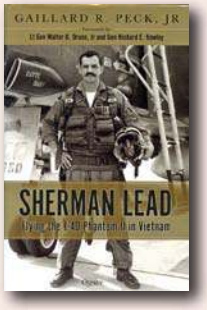
A quick round-up of what else is currently available for the aviation history enthusiast

THE BULGARIAN AIR FORCE IN THE SECOND WORLD WAR
Alexander Mladenov, Evgeni Andonov & Krassimir Grozev
Helion & Co; ISBN 978-1-912390-64-9; £29.99



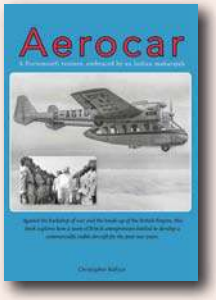
INDEPENDENT PUBLISHER Helion has carved itself a (hopefully profitable) niche in the market for highly specialised aviation history, and this 144-page A4 softback is another of the company's extensive, authoritative monographs on a subject that has had virtually no in-depth coverage. Written by three highly respected Bulgarian aviation authors, this profusely illustrated, exhaustively researched volume details the fascinating history of the wartime military aviation activities of Bulgaria, part of the Axis during 1940–44, and includes eight pages of excellent artworks by Peter Penev. **NS**

SHERMAN LEAD: FLYING THE F-4D PHANTOM II IN VIETNAM
Gaillard R. Peck Jr
Osprey Publishing; ISBN 978-1-472829-37-5; £25



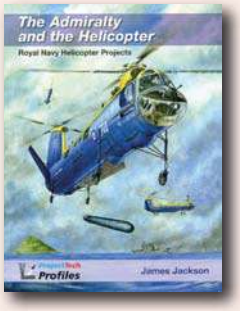
ON SEPTEMBER 19, 1968, USAF F-4D Phantom pilot Gail Peck Jr flew his first combat mission over Vietnam, beginning a year-long action-packed tour with the 433rd TFS — "Satan's Angels" — that included Operations *Rolling Thunder* (North Vietnam), *Steel Tiger* and *Barrel Roll* (both Laos). Based at Ubon in Thailand, the author undertook numerous high-adrenaline missions, which he describes in vivid detail, including, to his credit, those in which he didn't shine — firing a salvo of 19 FFARs harmlessly into a garden path in Laos during *Steel Tiger,* for example. With high production values, including a good colour map and a glossy section of some 68 photos in the middle, this is a gritty, well-written memoir of life at the sharp end. Literally. **NS**

AEROCAR
Christopher Balfour
Tricorn Books, available via dan@tricornbooks.co.uk; ISBN 978-1-912821-18-1; £15



AVIATION HISTORY is sadly littered with promising prototypes which, through no fault of their own, never made it into production. One such, the twin-boomed Portsmouth Aerocar of 1947, was a victim of politics in the UK and India. Its story is well told here by the son of its co-creator Lionel Balfour; the reproduction of many of his father's notes and papers in facsimile form lends a real sense of immediacy. **MO**

THE ADMIRALTY AND THE HELICOPTER
James Jackson
Blue Envoy Press; ISBN 978-0-956195-142; £11.95



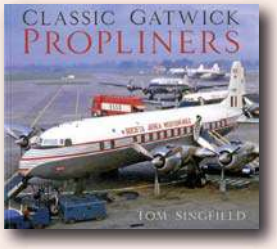
IN THE SEVENTH in the invaluable *Project Tech Profiles* series of softbacks from Blue Envoy, *TAH* author James Jackson details the development of the helicopter in Royal Navy service, from pre-war concepts from Weir and others to the modern-day Merlin. Accompanied by copious photographs, company drawings and useful line-art by fellow *TAH* contributor Chris Gibson, the easy-to-read narrative traces a line through the procurement of familiar types such as the Wessex, Wasp, Sea King, Lynx and Wild-cat, as well as including some fascinating oddballs. Another gem in this affordable series that has firmly established itself as "must-have" in the *TAH* library. **NS**

YESTERDAY WE WERE IN AMERICA
Brendan Lynch
The History Press; ISBN 978-0-7509-9000-4; £18.99



THIS JUNE marks 100 years since Alcock and Brown's pioneering non-stop crossing of the Atlantic in a Vickers Vimy, so this new softback centenary edition of the author's 2009 hardback is timely. The lively, accurate content is augmented with a new foreword by Alcock's nephew, Gp Capt A.J.H. Alcock MBE; a tribute by the late Steve Fossett, who with Mark Rebholz re-enacted the flight in 2005; and news of a new visitor boardwalk skirting the Derrygimla Bog landing site at Clifden, into which the Vimy partly sank in 1919 (and into which I too partly sank in 2005 while being guided to the very spot). **MO**

CLASSIC GATWICK PROPLINERS
Tom Singfield
The History Press; ISBN 978-0-750989-22-0; £20



CLEARLY A labour of love for the author, who spent nearly four decades as an air traffic controller — mainly at Gatwick— this treasure-trove of colour photographs from Gatwick's golden era is not only a visual treat, but also packed with useful and accurate info about the jewels on show. The 9½in x 9in squarish format serves the contents well, giving the spectacular images room to breathe and providing plenty of space for informative, well-researched captions. A volume on classic jetliners at Gatwick to follow, please! **NS**

Lost & Found

***PHILIP JARRETT** explores the lesser-known corners of aviation history, discovering little-known images and rediscovering long-lost details of aircraft, people and events. This time he is intrigued by a vintage postcard showing a Wright biplane having come to grief in Paris*

THE POSTCARD BELOW, depicting a biplane in a somewhat distressed state, has been puzzling me for a few years now. I acquired it from a source in France, and pencilled on the back is *"Accident d'un aeroplane au dessus de Paris"*. The aircraft is a Wright Model B, and it carries the number 16 on its rudders, which suggests that it had participated in an event or race at some time. It appears that it has either crashed or made a forced landing in the city, suffering severe damage to its wings and propellers.

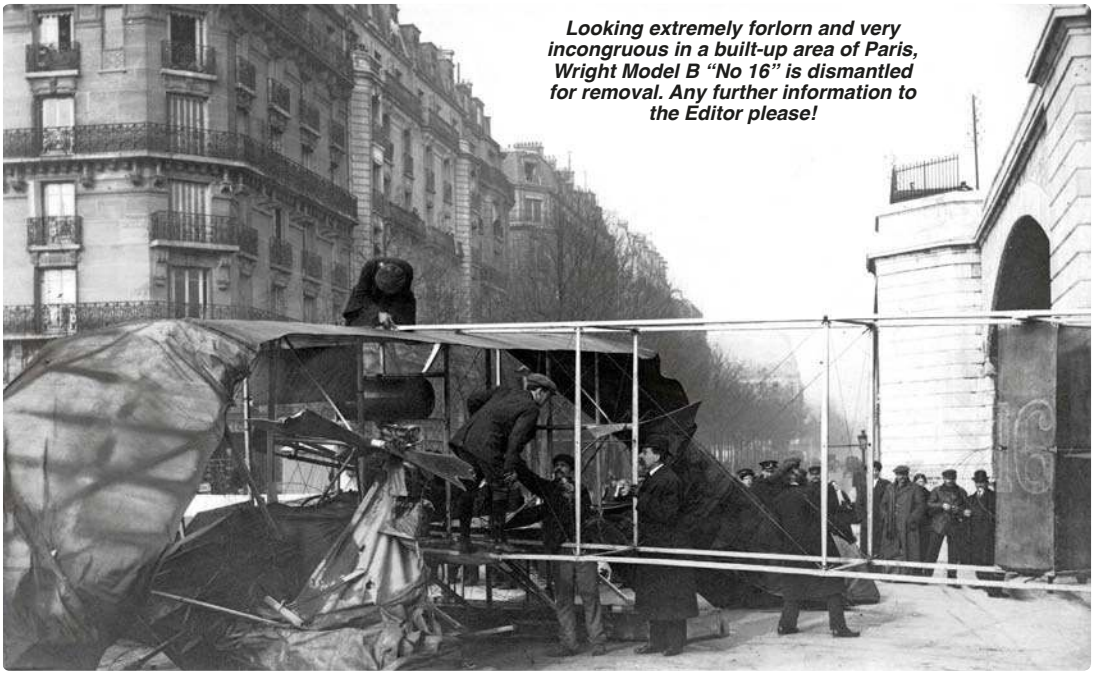
It might be expected that such an incident would have attracted a great deal of attention, but so far I have been unable to discover any more regarding the circumstances or date, despite having made an appeal to a contact in France. Perhaps someone can provide further enlightenment.

Another Churchill mishap

Having read the *Lost & Found* item in *TAH18*, Mick Davis of Cross & Cockade International has come up with another flying accident in which



the Rt Hon Winston Churchill (seen furthest right **ABOVE** at Portsmouth in May 1914) was involved. On July 18, 1919, he was in Monosoupape-engined Avro 504K E3705 of the Air Council Inspection Squadron at Croydon with Lt-Col Scott IIFA, when the aircraft stalled in a turn at 160ft (50m) and was wrecked. The occupants were reported to be "OK".



Looking extremely forlorn and very incongruous in a built-up area of Paris, Wright Model B "No 16" is dismantled for removal. Any further information to the Editor please!

DON'T SPARE THE HORSES!

FERRYING JOCKEYS BY AIR, 1965

Continuing his occasional series, **ED WILD FRAeS** recalls more of his flying adventures while working as a staff pilot for McAlpine Aviation in the 1960s, this time as a flying taxi-driver for horseracing stars Lester Piggott and Doug Smith, whose valuable tips on the day's races often proved rather profitable — particularly for the author's enterprising wife

IN 1965 TWO young housewives nervously entered the small betting shop in the sleepy village of Arlesey in Bedfordshire. The cheery owner greeted them: "Good morning, can I help you ladies?" Blushing, one of them said "Yes please, how do I put a bet on a horse . . . ?"

THE CHARTER BUSINESS

Charter flying can offer pilots many diverse tasks. In the mid-1960s I was employed by McAlpine Aviation at Luton Airport as a staff pilot. This provided the opportunity to get "hands on" with numerous aircraft types — a flying enthusiast's dream come true. I often had to fly quite dissimilar aircraft, and one of my logbook entries records five different types on the same day. One of the jobs which I was enjoying at this time was flying championship jockeys to and from various racetracks in the UK.

Jockeys Lester Piggott and the late Doug Smith, along with the occasional trainer, were usually my passengers. Going by air enabled the jockeys to ride at one course in the afternoon and get further commissions at an evening meeting at a different venue, often many miles distant. Air travel was the only solution.

The aircraft used were either a Cessna 310, a very competent machine that had acquired an undeserved reputation for difficult handling, or a Piaggio P.166, a product of the respected Italian company which produced aircraft with sound handling. The "Pig", as the latter was known, had the best set of ailerons of any aircraft I have ever flown. In addition, a Helio Courier — workhorse of the CIA in south-east Asia — was occasionally called on. The Courier had a few tricks up its sleeve, one being the ability to frighten passengers out of their skins when, without warning, the automatic leading-edge slats would pop out as speed was reduced on final approach. This produced the most almighty bang, like an empty dustbin falling off the council bin lorry.

MIKE HOOKS





MIKE HOOKS

ABOVE ***McAlpine Aviation operated a number of Piaggio P.166s, the first of which was G-APSJ (c/n 354), which was sold in 1963 to Air Charter of Perth, Australia. With its cranked gull-wings and pusher engines, the type was unusual — and popular with its pilots, despite being given the nickname "the Pig".***

The choice of aircraft depended on the load carried and length of runway available at the destination. A typical day of jockey-flying would be a pick-up near Newmarket racecourse in Suffolk, where the jockeys were often ready and waiting. Our departure for one of the UK's many horseracing courses quickly followed. I came to learn that punctuality and discipline were important parts of a jockey's lifestyle.

Both men were slaves to their diets; Lester's breakfast was rumoured to be "a cigar and a cough". They allowed themselves few treats when racing, Doug Smith's preferred luxury being a bottle of Russian Imperial Stout. This tipple — supposedly a favourite of Peter the Great — was contained in the smallest beer bottle I have ever seen. Doug would open this homeward bound on the last leg of the day and, savouring the contents, would sip slowly and reverently from the bottle, consuming it by the time we arrived back at Newmarket.

TO HAYDOCK PARK

Because of the busy racing calendar, delays and operational changes were unwelcome. On one trip in October 1965 I departed McAlpine's home base at Luton in Cessna 310 G-APTK, feeling some unease about the weather forecast further north. Newmarket was in the clear, however; and, with the jockeys settled in their seats, we were soon airborne again on an instrument flight plan, bound for the racecourse at Haydock Park, north-west of Manchester Airport, and where both jockeys were riding that afternoon.

We flew on in deteriorating weather conditions, receiving a handover to Manchester radar. The controller enquired if the race meeting was still my destination and promptly offered



ABOVE ***Two of Britain's most successful flat-racing jockeys, Doug Smith (left) and Lester Piggott, at a meeting in the mid-1960s. Smith died in 1989; a road named after him in Newmarket, Doug Smith Close, intersects with Lester Piggott Way.***

OPPOSITE PAGE ***Cessna 310 G-APTK (c/n 35453) in January 1964, with its stylish colour scheme emphasising the type's attractive lines. It arrived in the UK from Belgium in 1959, where it had been OO-DST.***



ABOVE ***Another photograph of Cessna 310 G-APTK in its 1960s scheme. Sadly, this aircraft was destroyed in a fatal accident at Norwich in October 1974, when the starboard flap retracted uncommanded during the landing approach, causing the aircraft's nose to drop and roll into the ground less than a mile short of the runway.***



ABOVE ***McAlpine was the official UK agent for Piaggio aircraft, and the company used several examples of the P.166, including G-APWY (c/n 362), which went to electronics company Marconi in 1967, in whose colours it is seen here. This aircraft survives today and is kept in the Science Museum's storage hangar at Wroughton, Wilts.***



RICHARD T. RIDING COLLECTION x 3

ABOVE ***McAlpine also looked after the UK interests of the Helio Aircraft Company, the American manufacturer of impressive STOL types such as the H-395 Courier, McAlpine's own example of which, G-ARLD (c/n 522), is seen here after it had joined the fleet in 1961. It was later destroyed as a result of a ground-based engine fire in 1988.***



AUTHOR'S COLLECTION

LEFT ***The author in Jersey Airlines uniform while a line captain flying de Havilland Herons and Douglas DC-3s for the airline in the early 1960s. By 1965 he had joined McAlpine Aviation at Luton as a staff pilot, his duties being many and varied — including leading a memorable formation ferry flight of de Havilland Doves and Herons back to the UK from Jordan — see*** **The Melon Run *in* TAH25.**

radar positioning to the course, a suggestion I gladly accepted; we were still in thick cloud and cancelling my instrument flight rules (IFR) plan to continue visually was not an option. Unsurprisingly, Haydock Park racecourse had no landing aids, and GPS was yet to sound its insistent call to toe the magenta line.

I was given small heading changes while descending, working to match my height with the distance to run. Visibility was minimal and heavy rain danced up the windscreen in streams. The radar controller called again: "Tango Kilo, do you have the field in sight?" I did not. Single-crew hard-IFR operations in a busy traffic environment can be demanding, involving hand-flying and completing checklists while snatching quick glances ahead in an attempt to gain early sight of the runway. "Working like a one-armed paperhanger" is a fitting description. Despite tantalising glimpses of the fields below through small breaks in the clouds, there was still nothing to see ahead.

ENOUGH!

I pushed the throttles forward, retracted the flaps and undercarriage and requested clearance to Manchester. During the diversion I called our handling agent at Manchester Airport, requesting him to organise a taxi to hurry the jockeys back to Haydock Park. Lester was less than amused, brightening a little when I said I would bring the aircraft to the course after the last race if the weather lifted. Today's effortless communications make it difficult to remember that back then there were no mobile 'phones — another tool that is taken for granted today.

The two jockeys had quite different characters. Lester was famously taciturn and unsmiling, while Doug, on the other hand, was outgoing and approachable. As a racing novice, I was curious to observe how, on arrival at a course, two or three individuals gathered at the aircraft almost before the propellers had stopped turning. These were always the same sort of people; small in stature, faces displaying evidence of the outdoors life and clearly pleased to see Doug. I guessed that these were old racing men, ex-jockeys and stable lads, and those who had perhaps overdone the second helpings, all anxious to renew their acquaintance with the great man. Murmured conversations would follow before they scurried away. Doug saw me watching this scene one day and asked me if I was a betting man. I hesitated, and he promptly named a horse "running in the 2.30, should do well," he said, and then strode off for his first ride of the day.

A NICE LITTLE EARNER . . .

Back at home later that evening, displaying my modest winnings, I told my wife about the day's turn of events. Another racing job came up and at the course Doug again offered a single tip. I called my wife from the public telephone and mentioned the name of the horse. Arriving at home that evening I was met with a big smile. "Guess what I did today?" Plucking up courage, and supported by a friendly neighbour, she had placed her first bet, putting her pin money on the horse Doug had tipped.

I don't know if Doug gave these all of these individuals the same information (there was only ever one tip per meeting). Perhaps he did so as a thank-you to those who had helped him in the past. His predictions did not always bring results — but they certainly improved the odds for this novice. I suppose I should have seen it coming; within a week, word had spread around the village and the local bookmaker found his profits falling. On the next occasion that this by-now small platoon of housewives trooped into his establishment, he refused to accept their bets. To mix metaphors, the gravy train had fallen at the first fence!

A FEW WORDS ABOUT RICHARD T. RIDING . . .

RICHARD RIDING — "Dicky" to me — was the first port of call when seeking images to accompany this article. A friend for 60 years, he rarely failed to assist with these requests and always responded with a cheery "Righto mate, consider it done", all said in the "Goonish" voice he sometimes used. Aviation history has lost a good friend, and he will be sorely missed. **EW** (See pages 42–53 in this issue)



OFF THE BEATEN TRACK

Ever turned a corner to find something unexpected? The Aviation Historian's *intrepid aeronautical explorer* ***PETER DAVISON*** *investigates the stories behind the oddities that turn up in the most unusual places . . .*



THIS BOEING 727-281, registered HL7350 (c/n 20469), currently residing at Inha University in Incheon, South Korea, made its maiden flight on December 29, 1970, before being delivered to Japan's All Nippon Airlines (ANA) as JA8831. After a decade of ANA service, it was sold to Korean Air in December 1980, giving another ten years of service before suffering a wheels-up landing at Taegu (now Daegu) in South Korea on June 13, 1991. The accident report stated that the crew failed to read out the landing checklist, did not extend the undercarriage, then pulled the circuit-breaker when the warning horn sounded. Fortunately for the 127 aboard, there were no casualties.

The aircraft was damaged beyond repair, and in December 2002 was relocated to a campus at Inha University, which hosts around 20,000 students, mainly studying engineering-related subjects, and where the Aviation Management Research Institute was established in 1976. The campus boasts some nine airframes, some used by students and some apparently only for display, including a Cessna O-1 Bird Dog, a Beech C-45 and a Douglas C-47. The campus is located ten miles (16km) east of Seoul's main airport and may be seen on Google Earth by entering co-ordinates N37.447071, E126.657281. This is not the only Boeing displayed in the city; a B-52D Stratofortress resides in the impressive war memorial at N37.535259, E126.978525.



Find us on Facebook at *www.facebook.com/The Aviation Historian* and Twitter *@AvHistorian*

PETER LEWIS

Coming up in future issues:

The Lone Wolves of Fliegerstaffel 10 *Peter Lewis details the high-speed low-level career of the Mirage IIIRS in the Swiss Air Force's dedicated front-line Cold War photo-recce unit*

Airbus: Brexit 1970s-style *With the recent cancellation of the A380, Prof Keith Hayward rewinds to Britain's early "in again, out again" involvement with the Airbus project*

Flying the Natter *Dr Brett Goodman examines the medical challenges facing the pilots of the Luftwaffe's vertically launched Bachem Natter rocket interceptor*

TAH

The Aviation Historian®

The modern journal of classic aeroplanes and the history of flying

Be certain to receive each new issue of The Aviation Historian *hot off the presses, by taking out a subscription. It's quick and easy to do. Issue 28 published July 15, 2019*

ALL BACK ISSUES AVAILABLE *(No 1 now reprinted!)*

Annual Print Subscription for one year (4 issues): **£44** (UK), **£53** (Europe), **£62** (RoW)

See our website for more details of both print and digital versions:

www.theaviationhistorian.com



TEL 07572 237737 **WRITE** TAH, PO Box 962, Horsham RH12 9PP, UK

Digital edition available via our partners pocketmags.com

Available on the App Store | Available on kindle fire | Available on PC & Mac | Available on BlackBerry | Available on the Google play

WHAT THEY'RE SAYING ABOUT *THE AVIATION HISTORIAN*



"The latest issue is a ripsnorter. I'm still wiping the drool off the pages after flicking through! " — Subscriber Dr Anthony Cooper, Brisbane, Australia

"Your journal is the only bright spot in the current wasteland of historical aviation magazines, and I await every issue with bated breath. Every issue is engaging, informing and entertaining" — Subscriber Ian Gavaghan, Ontario, Canada

"Looking forward to it. Singularly the finest of its genre. Essential reading for aircraft obsessives!" — Reader William Martin, London

"*The Aviation Historian* is the best English-language aviation history publication available today" — aviation historian Tom Cooper

concorde: the politics / argentina's F4U corsair ferry flight / richard t. riding / hispano-helwan ha-300 / qantas indian ocean catalina services / papin-rouilly gyroptère / typhoon tail tribulations / bahamas world airways / junkers K 47



BAE SYSTEMS

The Aviation Historian®

The modern journal of classic aeroplanes and the history of flying